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**How Women can enhance the Level of Innovation: Case
Studies of Women's Contributions in the Construction
Sector in the UAE**

تأثير العنصر النسائي على مستوى الإبداع : دراسة أمثلة لمساهمات نسائية في
مجال الإنشاءات في دولة الإمارات العربية المتحدة

By

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Dedication

This work is dedicated to my family, my supervisor, and my friends. For all the support you provided and the faith you had in me, thank you.

Samah As'ad

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المخلص التنفيذي:

موضوع تأثير النساء على الإبداع في مجال الإنشاءات في العالم العربي لم يلق اهتماما كبيرا من الباحثين. السبب في ذلك هو قلة عدد النساء في هذا القطاع و الذي سببه التحديات التي تمنع دخولهم إليه. هذه الورقة تسعى إلى التحقيق في دور العنصر النسائي في مجال البناء و التشييد في دولة الإمارات العربية المتحدة من حيث تحسين مستوى الابتكار مما قد يشجع النساء الأخريين ليحذوا حذوهم لدخول هذا المجال و يتفوقوا محدثين خطوة للتغيير في ثقافة القطاع و البلد.

ستتم مراجعة الأدب المحيط بالإبداع ، المرأة في مجال الإدارة ، طبيعة قطاع الإنشاءات ، النساء و الابتكار و دور المرأة في هذا القطاع مراجعة شاملة لبناء إطار مفاهيمي تحلل على ضوءه كل دراسة. هذا البحث يتضمن إجراء خمس دراسات حول خمس شركات إنشاءات مختلفة في دولة الإمارات العربية المتحدة. ستتم ملاحظة و إجراء مقابلات مع خمس نساء قمن بالابتكار.

أخيرا، سيقدم ملخص عن كل الدراسة متبوعا بالنتيجة التي تفيد بأن المرأة تستطيع التأثير على مناخ الابتكار و عمليته بطريقة فعالة عن طريق العمل بجد لتمثل قدوة للأخريين تحفيزا لهم ليبدعوا و يصنعوا التغيير. يتم ذلك عن طريق أخذ خمس عوامل في عين الاعتبار: صفات بطل الابتكار، بيئة الفريق، إدارة الشركة، مساندة أصحاب المصلحة، و اللوائح الحكومية التي تؤثر على نتائج الابتكار.

Executive Summary:

Women's contribution to innovation in the construction sector in the Arab world is an issue that has not received much attention from researchers. The reason for this is the low number of women in this sector that is caused by several challenges hindering their involvement. This paper seeks to investigate the contribution of women in the construction sector in the United Arab Emirates in terms of enhancing innovation that may encourage others to follow in their footsteps to enter this sector and excel, resulting in a step change in the culture of the sector and the country.

Literature surrounding innovation, women in management, construction sector nature, women and innovation, and women in construction is thoroughly reviewed in order to build a conceptual framework wherein each case study is analyzed upon. This research study involves conducting five case studies from five different construction companies in the United Arab Emirates. Interviews and observations are done with women who have brought about innovation.

Finally, a summary of the whole paper is presented, followed by a conclusion stating that women can effectively influence the climate of innovation along with its process by working hard to set an example for others to follow, motivating them to innovate as well and make a change. This is done by taking into consideration the five factors: the qualities of the champion of innovation, the team environment, corporate management, stakeholder's support, and government regulations that affect innovation outcomes.

Chapter 1

Introduction

This dissertation investigates the role women can play in enhancing the level of innovation in the construction sector. It answers the questions of what challenges women face and how they overcome them, what innovation is and how it works, and what innovations possible in the construction sector. The two subjects of both women in construction and of innovation in construction have not been given enough attention in literature, especially in the Arab world. However, they are interesting areas of research. In addition, encouragement is strongly needed in this region, as traditions and the strong cultural influence are highly resistant to change. This prevents many women from pursuing their careers in an industry such as construction. As a result, it is becoming increasingly more difficult to ignore such concerns.

It can now be stated that the focus of this paper is the United Arab Emirates (UAE), one of the Gulf countries that is known for being a wealthy, with a diverse community. Diversity is mentioned because foreigners constitute the majority of the UAE's population, so finding national role models for the research will be difficult.

Literature needs to be reviewed in depth for four main topics. The first topic is women at work issue. The second topic focuses on the effective management of innovation, thirdly, innovation in construction and its dynamics, fourthly, women in construction. It is worth mentioning that the latter two topics were not paid significant attention by the literature, as they are of little or no concern to Arab countries. Another point to highlight here is what is meant by the "construction sector", which refers to executing projects on work sites and/or planning and managing projects in the head offices. This paper starts by defining the four topics in detail and sequentially building a framework for which study cases will be compared to and evaluated accordingly.

The first topic has rich literature. Especially when comparing men to women in management. Many scholars have found that the profile of men and women at work is similar in terms of demographics, meaning they both may have the same nationality, education and religion. Nevertheless, they are different in terms of experience gained, academics chosen, and, in turn, skills developed, such as problem solving and business approach (Brush, 1992). From here, Brush (1992) concluded that women's selection of their career or businesses is influenced by these differences.

Kwasniewski and Nęcka (2004) conducted another comparison between men and women working in managerial positions in terms of their perceptions of the “climate of creativity in the workplace.” They concluded that Innovation needs to be managed; it requires experience and managerial skills, such as conflict resolution, leadership, and the ability to manage teams. They argued that women have developed these skills and abilities in addition to overcoming several challenges not faced by their male peers. In the following chapters, in-depth literature is reviewed to show the development of women’s careers and how this development aids in managing innovation processes.

The second topic is innovation, which is expected to be a new idea, a new way of solving a problem, or even a new creative invention. However, the company needs to define the type of innovation and the factors affecting it before deciding on the innovation process (Jaskyte, 2011). Each company has its own innovation process, but according to Euchner and Henderson (2011) most of the companies have designed their innovation processes like a funnel, starting by gathering as many ideas as possible, nominating the most suited of them; filtering those to limit the selections, then enhancing and supporting, and developing them; and, finally, investing in the selected ones, “thereby limiting the investment in "weak ideas" and increasing commitment to a few good ideas as the funnel narrows” (Euchner and Henderson 2011, pp.1).

The third topic is innovation in construction; which includes problem-solving ideas, environmental and safety considerations, and much more. Kurtz (2003) argued that Women can come up with and manage these innovations as well as men, because nowadays the rights and responsibilities of women are nearly equal to men in almost all aspects of the jobs, and sometimes, they can be more qualified than their male counterparts. Therefore, the barriers facing women should be crossed because:

“Until women are fully represented in the field of science and engineering, science is losing out on the talents of a vast number of potential contributors . . . Corporations are losing out. . . We all lose out”

Kurtz (2003, cited in Kaminski and Reilly 2004, pp. 28-29)

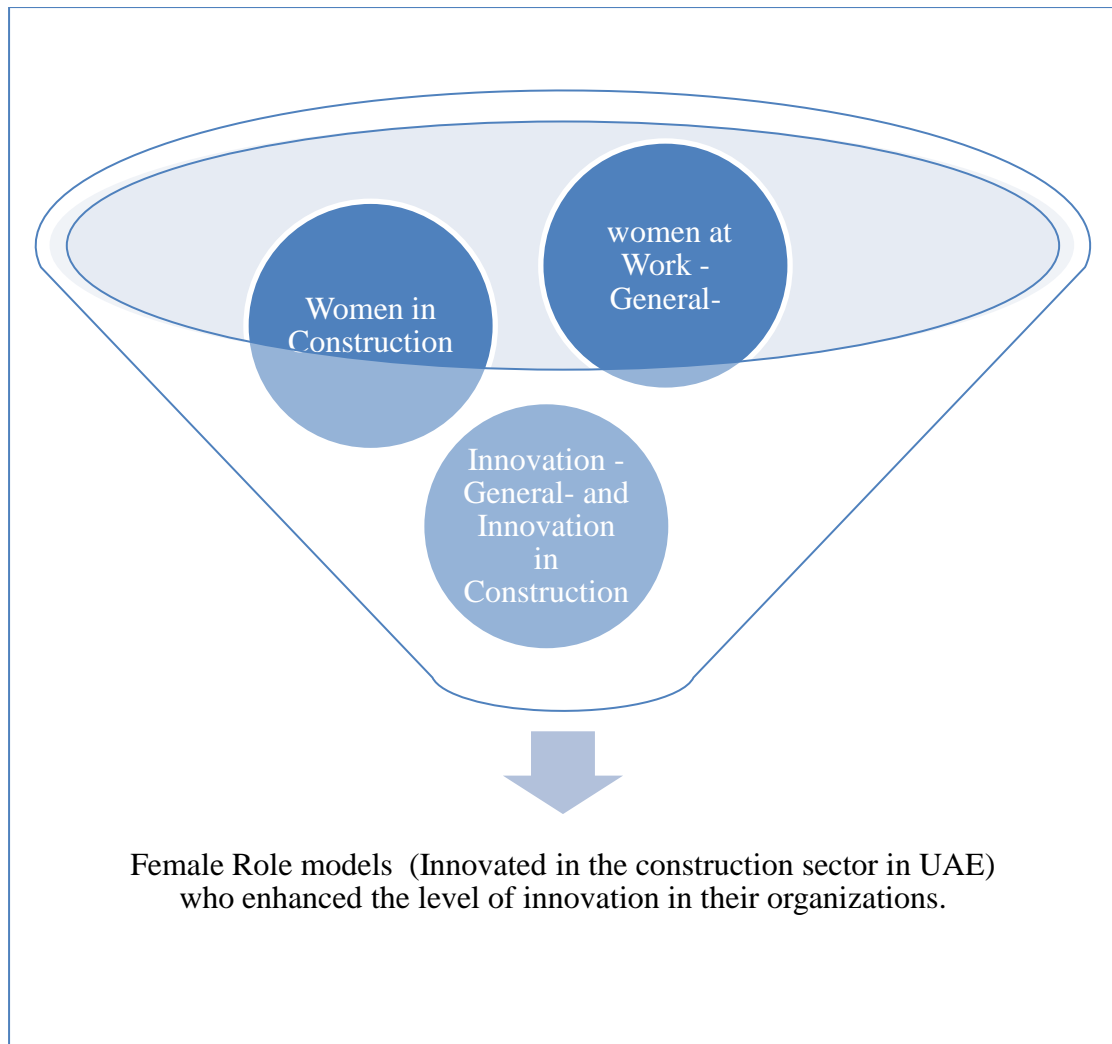
The final area, yet most important, is women in construction. This sector is known for its masculine-dominated nature and its long working hours. This work

culture has made it hard for women to join, especially in the Middle East, where the culture and traditions are highly valued by the community and society. Hence, the working opportunities for females are fewer when the job involves considerations as, for example, dealing with labourers, working long hours, and travelling long distances. Another reason may be the traditionally determined role of women in the Middle East. They are expected to establish their own families after completing their educations. As a result, they are having a hard time coordinating their responsibilities at home and at work. Other challenges facing women in construction sector will be illustrated later in the coming chapters. This situation is not necessarily unique to the Middle East. However, at least to this job market it seems other parts of the world have moved further, as Black and Spitz-Oener (2010) stated:

“Since the 1970s, women have experienced great improvements in terms of labor market success”
(pp.193)

It is worth mentioning that Galloway (2004) highlighted that construction sector is lacking diversity, which is holds professional engineers back from achieving greater successes and goals, so by motivating women to enter this sector some great achievements may be reached. In order to prove what women can do five cases that provide examples of women’s innovations in the construction sector in UAE will be discussed. These examples may encourage other women to follow in their footsteps to enter and contribute to this sector.

The following image provides a general description of the dissertation concept. The aim and objectives of this paper are introduced next, followed by the theoretical framework and the explanation of the dissertation’s chapter’s contents.



Picture 1.1: Funnel summarizing the research concept

1.1 Aim:

To examine the contributions women can make in the construction sector by enhancing the level of innovation, in order to encourage a step change in the role women can play in the construction industry of the Gulf region and the Middle East in general, which may filter through to the rest of the economy.

1.2 Objectives:

The objectives of this research paper are to:

- 1- Examine the process of innovation by focusing on the challenges management faces in realizing successful innovation.
- 2- Investigate the opportunities and challenges facing women in management positions and their contributions to the successful management of innovation.
- 3- Investigate the challenges facing women professionals in construction
- 4- Identify the contribution women can make to enhance the level of innovation in construction.

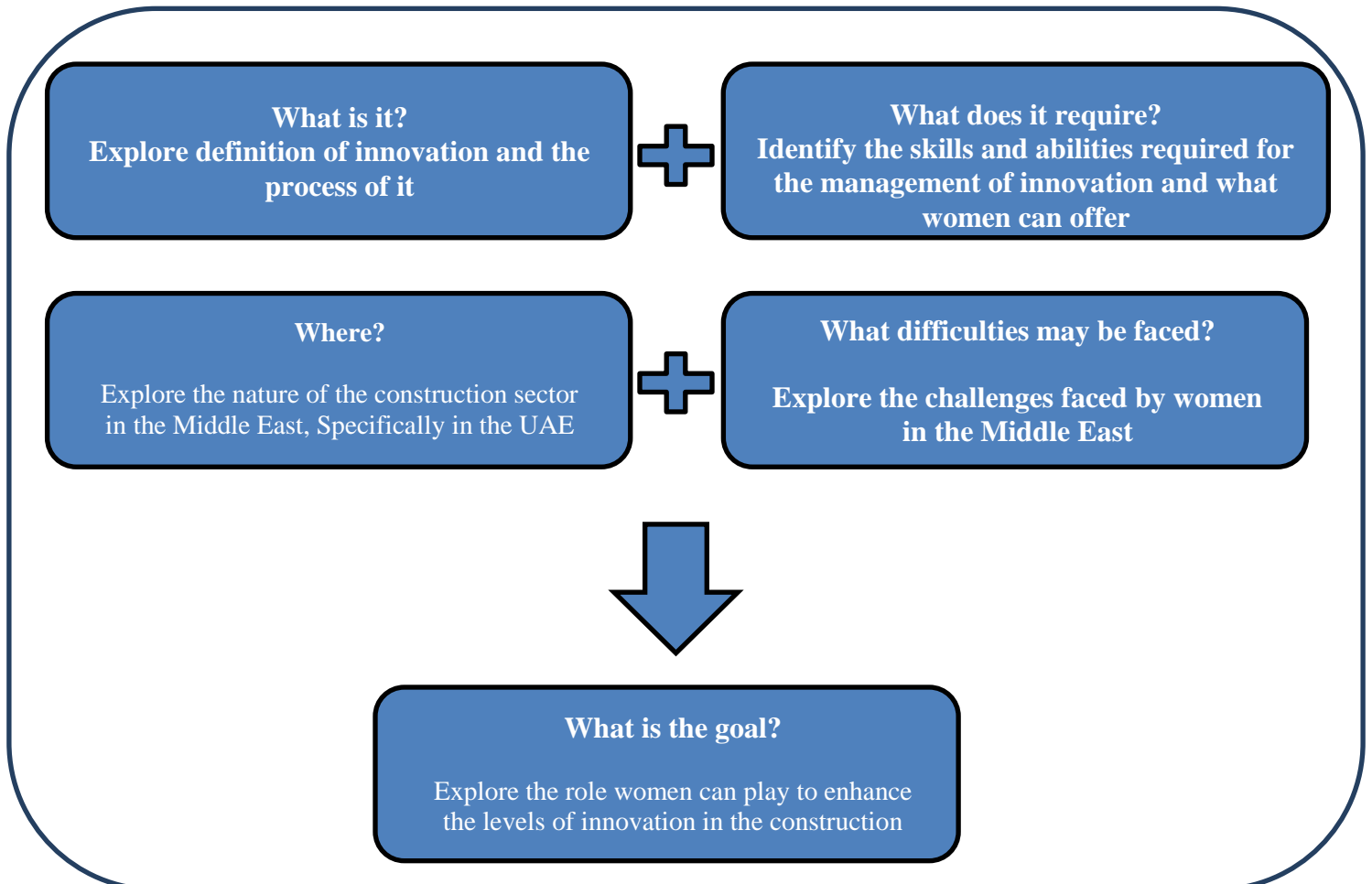
1.3 Theoretical Framework:

This research will proceed from the literature review to case studies presentation and analysis, and then to making conclusions and recommendations.

The work can be framed as follows: firstly, taking the construction sector in UAE into consideration, Innovation will be defined and the process of innovation along with its challenges will be illustrated and discussed. Depending on this, the management of innovation will be introduced. The skills, traits, and abilities needed for this type of management are proven to be possessed by professional women in the literature such as Burke et al. (1995) and Rosner (1990).

In other words, some scholars (i.e. Kwasniewski and Nęcka (2004), Black and Spitz-Oener (2010)) argue that because women have gone through more challenges in their career development in general, they can contribute to the process of innovation effectively to enhance it. Another point is that women face challenges in the Middle East more than men as the culture is conservative.

Consequently, studying the process of innovation, women in management, and challenges facing women in construction will lead this paper to the case studies examples and to encouraging women in the Middle East to be part of this sector and contribute to it innovatively. See picture 1.2.



Picture 1.2: Graph illustrating the theoretical framework

1.4 Dissertation progress:

In this chapter, the subject of the dissertation is introduced, stating the aim, objectives, and the theoretical framework of the research as a whole. Chapter Two begins by laying out the theoretical dimensions of the research regarding what has been written and discussed about the culture's view of women from the Arab world's lens, women in work challenges, women's rights and the support needed, the balance women are trying to pursue and some recommendations from them presented by certain scholars. A picture then demonstrates a summary of what women and society contribute to each other. Finally this chapter examines the culture, traditions and

mentality toward women and their professional progress from the UAE government's point of view as well as from the researchers' showing women's capabilities and the achievements made in this area.

Chapter Three describes what has been written and discussed about innovation, what it is, why it is essential, how it occurs, and what it needs. After that, the process of innovation, types of innovation, and management of innovation, which will help the reader understand it fully, are discussed. Chapter Four presents and criticizes compares and contrasts what has been written and discussed about the nature of the construction sector, reasons for the low percentage of women within the sector, solutions for that, chances of innovation in it, leading to what women may offer this sector. Chapter Five emphasizes on the aforementioned facts about innovation relating it to the construction sector. It examines the process, types, triggers and hardships of innovation in the construction industry, in addition to highlighting the current global position of the construction industry, which may open the door for research in UAE. This chapter will help this paper in clarifying the picture of innovation in the construction industry showing the challenges, opportunities and capabilities needed.

Following the literature review chapters, the research methodology is presented in Chapter Six; it shows what method is used for this research and explains why it was chosen. This chapter also provides a detailed description of the data gathering process to ensure that others who may replicate this research will obtain the same results depending on where and when the research is done. The data analysis and a discussion of the five cases showing women's contributions to the construction sector in UAE follow. Although these women faced many difficulties, they learned new skills and made innovative contributions in the construction industry. The limitations of the study are presented at the end of this chapter.

The final chapter consists of a summary describing the reasons for undertaking this research and discussing how the study was conducted. In addition, conclusions drawn from the results are presented. Finally, some recommendations for professional women in the construction sector and for those planning to join are presented, as well as ideas for future research.

Chapter 2

Women at Work

This chapter contributes to the second objective. It investigates the opportunities and challenges facing females at the workplace. The emphasis is on managerial positions, highlighting the skills that may contribute to management of innovation, which concerns chapters two and three.

Gender is simply a biological trait; it does not predict the way in which a person may behave in a workplace. For example, gender has nothing to do with being in a position of leadership, innovation, dealing with other colleagues, or decision-making (Choi and Hon, 2002). The concept of gender determining the way people act is caused by social expectations, which are the reason behind this belief. As Howard and Hollander (1997, cited in Choi and Hon 2002) mentioned, from a psychological perspective, that gender does not necessarily influence one's reaction. They stated that gender is *"the culturally determined behaviors and personality characteristics that are associated with, but not determined by, biological sex"* (p.232). Therefore, involving women in different sectors may yield more success in increasing their involvement compared to men.

2.1 Gender and Management

Research is vast on gender in terms of recent beliefs, attitudes, concerns, and material conditions; yet, gender is a sensitive area of discussion for specific schools of thought that are characterized by being of current organizational realities, assumptions, and concerns (Marshall, 1995). Although special attention is given to masculinity in the labour market, gender has been neglected historically within management research which used to be done by men on men (e.g. Ginzberg et al., 1951; Goldthorpe et al., 1969; Guest, 1956; Hall, 1976; Herzberg, Mausner and Snyderman, 1959; McClelland et al., 1953; Mintzberg, 1973; Super, 1957; Taylor, 1911). In addition, gender in management literature still centered on specific sectors, such as leadership, organizational behavior, and human resources management; furthermore, it has been ignored in some fields such as production, finance and marketing (Broadbridge and Hearn, 2008).

The vital issue that research on gender has to confront nowadays is the conceptualization of the fact that gender is no longer a problem. The reason behind this is primarily the media, which publicizes that the future is for females with the advantages of having them, as well as putting their voices among those that need to be heard. Secondly, it is “generation Y” which includes those born between 1977 and 2000, who are convinced that gender issues are practically extinct (Kelan et al., 2009).. These facts are discussed below in more detail.

2.1.1 A Problem Resolved

From the above, the statement “the future is female” that has widely spread throughout the media has influenced the beliefs about female advantages. Based on that statement, many researchers have had optimistic expectations of women’s advantages such as the use of their emotional skills in the current customer-oriented economy (Davidson, 2007) the capability to put revenue with values before bonus without being greedy and to be risk aware and not risk takers (Craven, 2009). Reading this gives the impression that females are ready and well-equipped for the business environment, which is the case in the modern or new organizations that are customer-oriented and need the horizontal relationships instead of vertical hierarchies. These businesses need the feminine communication skills and their expected attention for emotions and co-operative teamwork. These contribute to the previously mentioned concept of being a problem resolved.

That media awareness has reached and convinced the age group ‘Y generation’. These eleven to thirty-four years-olds are characterized by being confident and independent as well as having faith in the concept of being a solved problem contradicting with the former generations. Women in this generation are supposed to be free and have choices with regard to work and life just like men (Kelan et al., 2009). Hence, the challenges facing females are seen as old problems that are no longer viable. Nevertheless, these challenges are still being witnessed in the workplace, such as the notable scarcity of women in senior positions that is claimed to be a cause of lack of ambition (Kelan et al., 2009). Add to this the fact that men and women both prefer to trust the fairness of the system in the organization (Whitehead, 2002).

2.1.2 Women's Voice Literature

Women's voice refers to the stories of what women experience or encounter that needs to be heard. Literature tried to defend women by showing that they may manage, learn, communicate, and negotiate in a way that is not less than but not similar to men, which results in encountering different problems. This research on women's voice shed light on:

- The gender difference in job development opportunities and job orientation (e.g. Burke et al., 1995).
- The barriers facing women in their professional lives (e.g. Oakley, 2000).
- The behavior of women as leaders (Rosener, 1990).

Fondas, (1997) emphasizes the gender difference as an investment that gives return in the management outcomes. Furthermore, Rosener (1990) pointed out the strengths and what they can add to an organization by adopting the expected style of leadership that is the transformational style. This style revolves around sharing knowledge and power and it has been related to the change in organizations- new market entry, customer oriented, and horizontal hierarchies that depend on communication channels and teamwork that requires interpersonal skills and collaboration. Thus, feminization is seen as an advantage rather than a weakness to avoid or resolve (Simpson et al., 2010). Although Ashcraft and Mumby (2004) disagree with this analysis due to the low number of women in senior positions, it has been influential in modeling principles surrounding the possibility of a change in perceiving gender differences in organizations and society.

2.1.3 Role of Organizational Culture

The work of Kanter (1977) shed light on the key role that organizational culture plays in shaping a woman's work experience. Since men represent the majority in the workplace, it is they who create the distinguished culture and they tend to put women on the sideline, add to this that they also are the ones who encourage the discriminatory behaviors such as preferring other men and using the stereotypes in administration (Broadbridge and Hearn, 2008). According to Liff et al. (1997), this male-oriented culture is usually spearheaded by a senior male manager who is responsible for determining the future of working women who eventually are

expected to adopt with the masculine norms although what is vital for men may not be as important to women (Kumra and Vinnicombe, 2010).

Accordingly, Ford and Harding (2010) found that even nowadays the dominated male culture makes women feel teased, lesser than others, and silenced. Several challenges are repeatedly mentioned in the literature. To mention a few, research shows that in high managerial positions, men are recruited more than women, are paid more, have more authority, have more job security, have better access to role models, do not face discriminatory behaviors and they are less stressed (Alvesson and Billing, 2009; Cocchiara et al., 2010).

It is worth mentioning the importance of having role models for young females. As Singh et al. (2006) concluded, females looking to advance in their careers tend to look to a different role model for each ambition, rather than looking at only one ideal role model who matches all of their requirements. They added that these role models do not need to be professionals or in senior positions to influence these females, they only need to be successful, close, and friendly. Lack of role models means lack of vision for the career future and may have serious consequences for young females, such as limiting their ambition and leading them to leave the sector to find reward in elsewhere (Singh et al., 2006). It is also important to note the time wasted by young women in the workplace as they determine how to present themselves or to behave with colleagues as Sheppard (1989, cited in Singh et al., 2006) mentioned. Therefore, the case studies will aim to find some of the role models in the construction sector who have enhanced the level of innovation to inspire young females to enter and excel in this field.

However, the current financial crisis has been broadly described as a cause of excessive masculinity by the National Council for Research on Women (2009) as men were seen to be huge-risk takers. The council also mentioned that a reshape of the masculine management with new set of practices described as feminine have occurred. One more challenge is the probability of recreating the idea that men are simply better by the masculinity studies believing in meritocracy that played a major role in paraphrasing gender drawbacks as personal choice issue not as cultural, official or organizational issue.

2.1.4 Meritocracy

According to Sturges (1999) men and women have traditional roles in the society that they are expected to play; men are focused on pursuing a specific career and in doing so they gain more experience than women, while the latter may not have the same chance. Progress in career or life not only depends on the evaluation of capabilities but also on the acceptance and approval of one's respective society, and because men have access to the social networks and the support systems they are able to overcome the individualistic measures on which excellence is founded (Kumra, 2010).

This has nurtured the perception of Wajcman (1998) which is that women's demotion within an agenda of equality results in unequal outcomes that are difficult to perceive or notice. Trusting meritocracy is a recommended answer to disadvantage /discrimination (Krefting, 2009), in spite of the fact that discrimination shapes managerial careers such as the slow advancement of women's promotion to board-level where they remain a minority (Vinnicombe et al., 2010). Hence, according to Bendl and Schmidt (2010) at all organizational levels, women are still discriminated against. For example, Turner (2010) stated that the UK needs 60 years before women are equally represented at board-level.

Women may witness discrimination almost like that of the culture of men's club, but because of their faith in meritocracy, females are frequently unwilling to highlight these behaviors within gendered administrative rules (Kelan et al., 2009). On the contrary, those behaviours are referred to the individual choices (Lewis and Simpson, 2010). It has been mentioned by Anderson et al. (2010) that female partners in a consultancy company have resigned from the job explaining their decision by personal excuses and not by the barriers and organizational constraints. This denial of discrimination, on behalf of personal choices, continues to occur as long as both genders put the blame on their choices and priorities (Kottke and Agars, 2005). Future research will therefore be challenged to investigate the hidden dimensions of empowerment and its effect on understanding the discriminating behaviors.

It can be concluded from this section that the concept of gender being an old and solved issue as generation Y and the media are convinced, may undermine its *raison d'être*. Here comes the role of research to challenge the theory that gender is no longer an issue by observing and analyzing the gender differences in, for example, pay, incentives, promotions, career progress, and also to explore the unknown dimensions of the power of gender (Broadbridge and Simpson, 2011). The future of the management research and gender today is oriented towards cutting budgets and costs which puts women at risk (Burke, 2010), as men have always been depended upon during previous recessions (Kottke and Agars, 2005).

2.2 Barriers

As this paper is concerned with women in the UAE, it would be prudent start this section with an example of a study that has been conducted by Nelson (2004) on the labor market in the UAE. He identified some characteristics of Emirati women employed in the private sector including being young, low paid, insecure at their jobs, and not as well educated as others in similar positions.

Nelson (2004) also examined the characteristics of female Emirati entrepreneurs and identified them to be independent and highly educated, which, according to Bröchner (2010), increases their chances of being recruited by an innovative company, as high education is linked to being more innovative. Emirati women at either end of the scale face different setups. For those in paid employment the problems include dissatisfaction with most aspects of the job, and the idea that each job is the only job to be found. For entrepreneurs, the problems include cultural and legal barriers as well as the absence of market support. Those are some of the professional barriers illustrating how women in Emirati society struggle to achieve a specific goal and why there are few of them found in construction.

Additionally, religious and cultural expectations are major barriers to women's career success and development, since women are seen as mothers with a family-oriented mentality, which according to social norms prevents them from attaining high corporate positions (Jamali et al., 2005). This fact is seconded by Abdulla et al. (2011), who shed light on the theory that it is preferred to recruit men rather than

women, as the latter's performance at work will be affected by family responsibilities, and consequently, she may ask for increased pay. In a 2008 UAE study issued by the Center of Arab Women for Training and Research (CAWTAR) and the International Finance Corporation Gender Entrepreneurship Markets (IFC GEM), it was found that the most common barriers faced by Emirati businesswomen are the high cost of rent, technology access, and financial education and experience. In addition to those challenges, women who are starting or own a business, usually have fewer employees, lower profits and lower sales volumes than their male counterparts, since their businesses tend to be smaller and more specialized in a certain part of the sector such as décor and painting from the whole construction industry (Mayer, 2008). However, there is a movement rising among businesses owners to improve women's skills. This movement aims to provide the required support to learn how to access technology and the market in home countries and abroad in order to grow the businesses (IFC GEM, 2007).

An example is provided by Kumar (2010) from the real estate sector where women are usually the end users and tend to be more convincing, patient, and organized than men yet being not as well paid. Kumar (2010) added that the government is empowering women to be as equal to men in the workforce as possible, but still the mentality needs time to change. However, the outside image of the UAE as being a developing country with a strong economy, openness, and high-rise buildings do not yet reflect the UAE's mentality of being modern, developed, and open to change in women's involvement in different sectors. The construction side is and always will be dominated by males. On the other hand, planning, design, and management of the properties are preferable places for women as these jobs require the abilities to multitask, be practical, and be organized (Kumar, 2010).

In a step towards change, the MENA OECD (2006) expressed appreciation of the role played by key positioned men in supporting the development issues of women's enterprises, as their vision will increase the awareness towards business access opportunities for women (MENA OECD, 2006). They highlighted that women in managerial positions need empowerment. It is defined by the Department for International Development (DFID), as the tool by which an individual obtains the

authority to perform, act, and think without constraints as well as taking decisions in society.

From the women's point of view, pursuit of balance is a barrier. Brykman (2006) interviewed a variety of women, stay-at-home mothers, part-time employees, and full-time employees to show the pros and cons of each life style and whether a balance between home and work can be obtained. She asked one question what do women have to do. They might stay at home to be good mothers and wives, take care of the house, and spend time with children while thinking about what could have been achieved elsewhere if they worked. Or, they might join the workforce and have a life with limited time for the house and children thinking of how to rest and spend more time at home? Brykman (2006) concluded that the solution is to think of short term solutions as women's needs change a lot depending on financial variables.

Baldock and Hadlow (2004) suggested that life balance can be reached by arranging all activities in a timely manner, which basically involves scheduling, although there is a factor that affects this process which is the characteristics and preferences of the male partner called the male-veto.

2.3 Facing Barriers

Considerable literature on women and their careers has found that the clashes women face between work and family responsibilities (Mainiero and Sullivan 2005), may force them to choose one or the other (Mavin, 2001). This explains the fact that women's choices of career are not similar to those of men because women have wider context and factors to think about (Omair, 2010). Culture limits women's career choices (Omair, 2010). However, women in Gulf countries represent the majority of students at universities and occupy high governmental positions (Forstenlechner, 2010).

Omair (2010) discovered that family connections and social status are major aspects in a woman's career choice and progress. In other words, he found that if a woman wants to work in a particular position, her family connections may reserve that spot for her and bring all the barriers down. Lerner and Almor (2002) illustrated that for a woman to succeed and overcome all the barriers, she needs to invest in developing and improving her capabilities, because women focus on quality and

understanding customer needs more than men do concerning revenues and cost, as mentioned by Powell and Mainiero (1992). This is evidenced by the fact that women define success in career different than men do. Women are concerned with job satisfaction and professional development, while men are concerned with pay and position (Powell and Mainiero, 1992).

Hence, it is recommended by Nelson (2004) as an initiative to resolve these issues:

- To update the policies of Human Resources in order to fit the new demands
- To change the culture gradually in order to encourage women
- To provide flexible employment conditions

2.4 Current Status of Women in the UAE and Government Efforts

As the UAE government has been committed to providing equal opportunities for women as well as empowering them, it is noticed that women status in the UAE has flourished in line with UAE's growth since the 1970's. Today, it can be seen that women are a vital part of the national workforce where they contribute to society economically and politically. Although there is much literature about the women in the Arab world, UAE may be different other countries in the region. This will be discussed in the following sections.

During this process of progress and development, traditional definition of a woman's life has changed considerably and the society has positively altered its mentality for the sake of the country's progress and women's contribution, however this did not alter religious teachings or heritage.

2.4.1 Culture and Women's Position

Religion, cultural boundaries and social believes in the UAE have put women in a specific position. This position implies that girls are meant to be wives and mothers; they have been considered the backbone of a family life and an essential part in the Islamic heritage conservation. These facts are stated by Ahmed (1992), who brought to the attention that the Islamic teachings presents the strongest impact on women's lives in the Gulf countries as it rules the way in which they live daily, deal

with others, and plan for future. Yet, it does not encourage them to develop careers. Moreover, Arab traditions are the key reasons that hinder evolution and growth (Ayubi, 1995). As for men, their role in the society is to work and provide for the family sufficient income. Hence, a woman to work is seen as unnecessary role (World Bank, 2007). Abdelkarim (2001) has a different opinion regarding the belief that family are against their daughters in terms of working.

Traditions like these have changed remarkably as noticed nowadays, as women are being encouraged and empowered to pursue high education and high positions. However this is not enough, they still face restrictions in choosing their career. An example is given by Baud and Mahgoub (2001) on this issue. They suggest that the distance restrictions limits the opportunities offered for women. Transportation affects the choice of a specific educational program and/or career choice as mentioned by Roudi-Fahimi and Moghadam (2004). Moreover, it affects internal motivation to carry out any entrepreneurial steps, since any absence or travel from family is not accepted. Another restriction is that women in UAE still do not apply for some professions that are male-dominated professions (Roudi-Fahimi and Moghadam, 2004).

Furthermore, society itself does not accept that women work in certain professions such as hairdressing and medicine, and within hotels and restaurants (Tumulty, 2007). Add to this religious considerations that force women to reject a position because of the fact that the organization does not run according to Sharia teachings. At present, in light of the new world economy, there is a notable expansion in the roles available to women in economic activities (Nashat and Tucker, 1999). This stems from what has been mentioned previously in this chapter about being risk-aware rather than risk takers, and being focused on profit with principles, as opposed to a greedy bonus.

Al-Awad and Elhilraika (2002) state that the UAE appears to be ahead of the Arab countries, in terms of educating women, and giving them the same rights as men. This implies that women will consequently earn more than men as they are better educated, but this is not the case. Al-Awad and Elhilraika (2002) explain the reasons by stating that education in the UAE is viewed from a perspective of being of

social worth, not economic value, and that females prefer jobs that are lighter, which in turn offers less pay than men.

When a female is in her first years of marriage and has children, the decision to work becomes harder as she will require the help of her family (Roudi-Fahimi and Moghadam, 2004). Otherwise, she can use the help of another person, such as an immigrant housekeeper, which are easily available in the Gulf States (Baud and Mahgoub, 2001). The latter option solved a huge problem for Emirati women, in addition to the support of the family which, according to the traditions and culture, is ever-present.

Women in UAE have overcome a lot of social and cultural barriers according to Nelson (2004, p. 32), who stated that Emirati women are:

“potential cornerstones of the UAE economy in the future. However, for this to become reality they need to be encouraged in their efforts and the remaining barriers to their progress removed.”

2.4.2 Rise of Women and the Government Role

Emirati women form fifty nine per cent of the national Emirati workforce in various arenas, such as science, healthcare, media, technology, engineering, law, trade, government, oil and gas, as well as academia (UAE year book, 2008). This rise was not caused by simply educating women, but also as a result of open-minded attitudes towards them, and regarding their recruitment as an opportunity for founding a developed and professional image. Not to forget the role models who encouraged women to enter unusual industries which were male-dominated, and proceed to excel within them. Statistics from the UAE Businesswomen Council (2005), showed that approximately:

- Six per cent work in business.
- Eight per cent are self-employed.
- Eight per cent are in partnership ventures.
- Eighteen percent are in the private sector.
- Twenty nine per cent are representatives of various private organizations.

- Forty per cent of females are working in the public sector.

Obviously the numbers only refer to locals (Emiratis), as this research is done in the UAE. However, the mentioned percent statistics do not show that in reality there are no or few Emirati women working in the construction sector. They are actually working in managerial positions in design, as well as consultancy companies. Thus, women concerned in this paper are those who live in the UAE, regardless of their nationality.

Another study shows that in construction:

“Women’s economic participation has increased from a mere 5.4 per cent in 1995 to 27.9 per cent in 2008 (UAE, 2008)” (Omair 2010, P.123).

Nine out of forty Federal National Council members are women, 66% of Emirati employees in the public sector (medicine, education, mediation and the armed forces) are women, and they occupy 30% of managerial positions. This progress is due to the previously mentioned facts of being well educated, which is the main reason that prevented them from entering the workforce, along with government support and cultural believes (UAE, 2008). Compared to other countries, local and international women’s participation in the total workforce in the UAE is 41%, Qatar 42%, Jordan 16%, and Iraq 15%, while in Kuwait for example it is 43%, and in the UK 56% (UN, 2010). The UAE is now ranked thirty eighth on the scale of UN Human Development Report Gender-Related Development Index (UAE, 2010).

The Emirati government is focusing on equipping women with the necessary tools to accomplish excellence in their chosen careers and professions. The goal of the strategy is to push women towards entering both the public and private sectors, in order to provide them with diverse opportunities, in case they were to choose any path. From a political point of view, the UAE government considers women’s empowerment as being essential in enhancing their involvement in politics as mentioned in the United Arab Emirates year book (2010). Involving women themselves in constituting rules in different aspects will definitely make them more effective. Currently, female parliamentarians in the UAE are involved in reviewing laws, evaluating public concerns, and attending council meetings.

It should be kept in mind that although the government is offering all this support, it is vital that women themselves put effort in themselves. Their commitment is the government's reward. However, the platform to achieve should be given to them. A suggestion from the government is to raise awareness on positive discrimination towards women in order to energize them into entering male-dominated sectors, which in time will bring about a more equal society in the UAE. Another step towards encouraging women, and from what Galloway (2004) and Fielden et al. (2001) recommended in preceding chapters, is the emphasis the government is putting - through educational organizations - on removing the social and psychological barriers that hinder women's entrance to the private sector (Construction), or in other words to be part of the workforce.

To show women's professional progress, and the fact that women have already entered the industries formerly known for their masculine-dominated sectors, many outstanding examples exist. For example, the women who became the first female judge in UAE history, the first female Emirati pilot at the General Civil Aviation Authority, and the first female army brigadier. These women are role models for all others across the UAE. Hence, it is now common to see women working alongside their male compatriots. Women have also entered the fields of arts, media, and academia. They are part of the cultural authorities in which they lead and direct strategies for the cultural growth of the UAE. Furthermore, entrepreneurship is garnering increasingly greater interest among women, and according to the figures in 2006, the UAE was found to have the largest number of businesswomen in the region (Al-Gurg, 2006).

2.4.3 Businesswomen and Entrepreneurs

As has already been stated, the government has been encouraging women to be part of economic development, especially as the number of businesswomen is increasing in the region. As a result, several conferences are held every year on different issues related to gender in order to stimulate the involvement of women in all sectors. It is worth mentioning here that the Ministry of Foreign Trade launched a research project in 2008 titled "The Emergence of UAE Women as an Economic

Force”, explaining what Emirati women have achieved, and providing some role models as examples. Hopefully the same efforts will be put into encouraging women to enter the construction industry as well.

Although this may not be related to this paper’s exact setting, it is vital to recognize that in the UAE there are several organizations established for the empowerment of women, including:

- **Dubai Women Establishment (DWE)** is an organization working since 2006 on the issue of gender equality in the UAE and Gulf states. One of its initiatives is the “UAE Women Leadership Program”, which is meant to train and prepare Emirati women to be leaders.
- **General Women’s Union (GWU)** was founded in 1975, a few years after the UAE federation. It performs a key role in the government’s strategy so that women may have an encouraging environment in which to work. The GWU supports women who are starting their own small businesses through offered training programs, such as “Women in Technology”, which was funded by the US in 2007, and “Know your Rights” in 2009. This government-funded union is also concerned with proposing and amending laws for the benefit of women. Its strategy revolves around pushing women to develop and enter sectors such as the economy, information, health, law, environment, politics, and applied sciences.

Finally, recommendations by CAWTAR/IFC GEM (2007) are introduced to address the formerly mentioned challenges faced by women in the UAE:

- Provide more flexible rules for employment, and ease the access to funds for women starting their small-to-medium enterprises. These may be implemented by the policy makers.
- Provide updated market studies so that women can understand what the market needs. This may be implemented by financial bodies.
- Search for external links to support them and provide training in finance management, leadership skills, and new technologies for developing businesses. These may be implemented by organizations concerned with women in businesses.

Following is a summary of what was written and discussed in this chapter.

2.5 Summary

Women in management, whether as entrepreneurs or employees, have been discussed in this chapter. Following is a figure that summarizes the chapter.



Figure 2.1: Women Challenges and Opportunities

The next chapter discusses innovation and its aspects in detail, in order to use this knowledge in the succeeding chapters.

Chapter 3

Innovation

This chapter is one of the richest in this thesis, as it contributes to the fulfillment of three out of the four paper objectives. The first objective is to define the innovation process and the challenges facing management in recognizing and assessing it, the second to investigate the management of innovation, and the fourth to define levels of innovation.

Several forms of research have already been carried out about innovation definition (Tatum, 1986) and innovation sources (Slaughter, 1993). Leading innovation flows to the construction sector (Arditi et al. 1997 and Slaughter 2000) and innovation process management (Winch, 1998). Add to this the literature on social structure of the construction sector (Dubois and Gadde, 2002) and how it affects knowledge sharing and communication of new ideas among different parties involved in a project (Egbu 1999, Loosemore 1998 and Dulaimi 2007). Innovation here is defined by Dulaimi et al. (2005, pp.566) as “the generation, development and implementation of ideas that are new to an organization and that has practical or commercial benefits”.

Thus, the word innovative does not only mean coming up with a new idea, but a mixture of motivation, good ideas and customer and market understanding. As said the saying goes an innovative business is one that thinks and breathes “outside of the box”. Sometimes the two terms invention and innovation become confusing. Galloway (2004) illustrates the differences between invention and innovation, as invention means coming up with a new idea or product, while innovation is invention and transferring it to be of commercial benefit. Grant and Berry (2011, p.73) point out that the key for innovation is internal motivation, which in turn should be supported by social motivation, and most importantly by “perspective taking”, giving rise to new ideas. By perspective taking they refer to the innovator’s clear perspective of what to innovate and what its precise purpose will be.

In this chapter, first the process of innovation is explained, followed by an illustration of the management of that process. After that, the challenges of the process and its champions are identified.

3.1 Innovation Process Management

In his study, Ling (2003) states that innovation could be the fourth necessary component, as the pressure exerted on the other three – lower cost, improved quality, and tight deadlines – is persistent. Ling (2003) studied the process of innovation and identified the factors affecting its benefits in terms of both the project team and the project itself in the construction firms. These factors are separated into four categories:

- a- Interest of project team members
- b- Working environment
- c- Capabilities of the people involved in the innovation
- d- Formation of a task group

Dulaimi et al (2002) identifies the factors necessary to recognize innovation:

- Goals: Having a clear, achievable goal to change
- Constraints and Capabilities: Minimize constraints and maximize capabilities. For example, switch from design and build contracts since this type increases the chances for innovations instead of design-bid-build, which causes “fragmentation”.
- Effort: establish a reward system, co-operate between different firms in one project to encourage innovation.
- Challenges and commitment: challenges such as time constraints. If time and job security are granted, employees can come up with new ideas. Commitment should be made by the senior management, stakeholders, and promoters.

Another point worth mentioning is that Hartmann (2006) came up with a figure to predict whether a new idea is going to perform well or not, and this figure contains all the surrounding variables (Figure 3.1) affecting the innovation: idea, product, or practice. By studying these variables and managing the innovation well, a person can predict the result of an innovation.

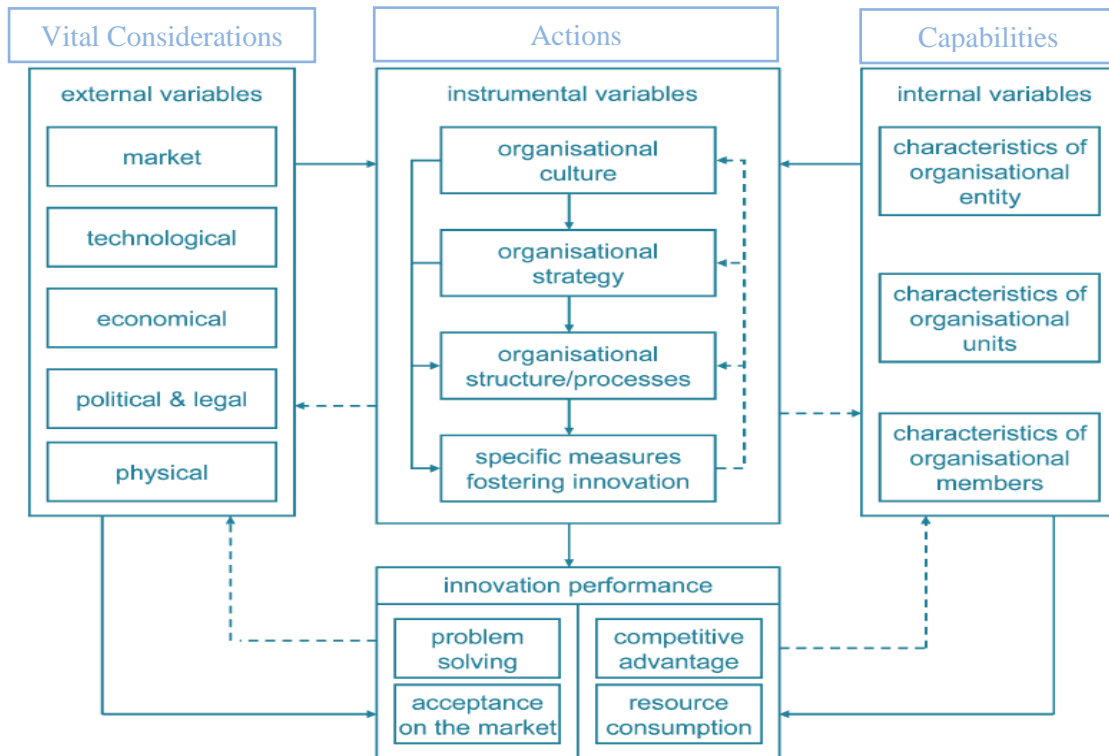


Figure 3.1: Framework of innovation management (Adopted from Hartmann 2006, P.569).

As managing innovation is like managing a process, it is vital to have some idea of what this process is and how it evolves. Kale and Ardit (2010) presented a model that displays the progress of an innovation process as an S-shape curve, with the Y-axis presenting cumulative innovation adoption, and the X-axis presenting time.

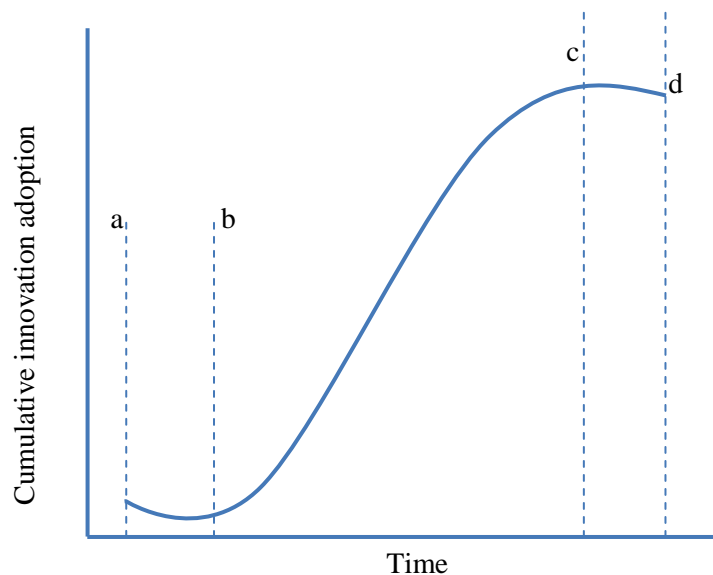


Figure 3.2: S-Shape Curve shows innovation process

Where:

a-b Initiation of the idea

b-c Adoption – managing innovation-

c-d Saturation

By studying these results, it can be concluded that an innovation process is not funneling ideas, but managing constraints by understanding the relationship between customer needs, capabilities and strategy, which presents a challenge for managers (Euchner and Henderson, 2011). The next task is selecting an idea. To nurture the idea there are five steps according to Euchner and Henderson (2011):

- 1- Strategic questioning: understanding the market and its needs.
- 2- Understanding customer needs.
- 3- Inventing, brainstorming.
- 4- Creating a new value proposition.
- 5- Testing and refining the idea.

The challenge of identifying and examining beneficial innovation remains. For that reason, Dikmen et al. (2005) propose a simple framework to examine innovation systems in different companies (Figure 3).

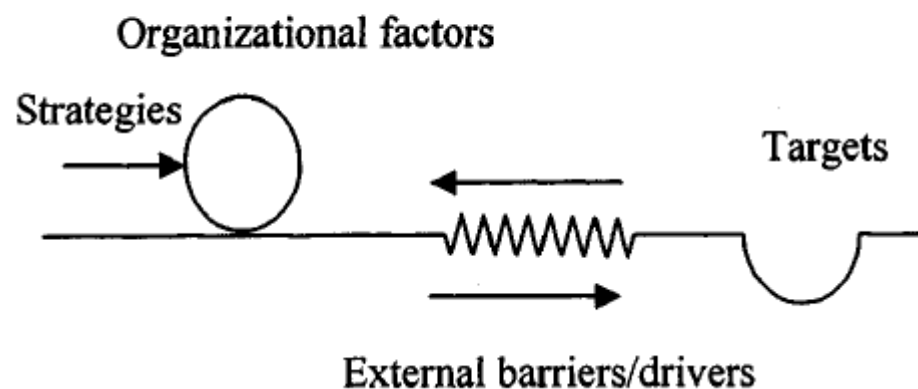


Figure 3.3: proposed framework for examining innovation systems in different companies. (Adopted from Dikmen et al. 2005, p.82).

The ball and the hole represent the company and the desired position, respectively. The force pushing the company towards the targeted position is the strategy. The magnitude of the force is determined by the organizational factors characterizing the weight and shape of the ball, and the length of the distance between the ball and the hole is determined by the external barriers and drivers that may change the direction and speed of the ball. It was discovered that to describe innovation systems in the construction industry using this framework, it is essential to look at the interaction of all the factors and not only at one or some of them.

3.2 Levels of Innovation

Innovation is becoming a familiar word that labels any new idea, product, or service aiding companies in surviving the market financial crisis, especially as the world is now in the second decade of the century (Silver-Greenberg, 2010). It is true that some companies use the word innovation only for commercial purposes, even though nothing is actually being innovated (Jana, 2007). However, most companies are innovating in response to the market needs, especially after the crisis, and often innovate only to remain operational and viable in the market (Hamm and Slywotzky, 2009). Because of this, top management needs rules and criteria to assess the ability of its employees to innovate. Miner (2010) declares that the concept of innovation consists of four different levels. It is also worth mentioning that each of the four levels is subdivided into two levels, which are the time and effort needed for each innovation. The four levels are explained next as Miner (2010) described.

Level One

| Degree of Change | Investment amount | Risk |
|------------------|-------------------|------|
| Low | Low | Low |

This level of innovation includes minimal changes of services or products, as shown in the table above. For instance, level one may be a change in the logo colour. Basically, all companies can attain this level as no special skills are required.

Level Two

| Degree of Change | Investment amount | Risk |
|--|-------------------|--------|
| Enhance an existing product, upgrade an existing product | Medium | Medium |

At this level, innovation includes changes to an existing product or service that have proven to be commercially beneficial, so that a medium investment to enhance it would be accepted by top management. Furthermore, management may give approval to take this innovation a step ahead if it demonstrated its ability to pay back the time and cost.

Level Three

| Degree of Change | Investment amount | Risk |
|----------------------------|-------------------|-------|
| New product, service, idea | Large | large |

At this level of innovation, the market should be surveyed to check whether it will sell as planned or not. Because the third level takes large investment and risk, it is expected to give large benefit. Hence, it is needed in this level to monitor and assess the process of innovation, resources, and its outcomes. A good example of this level is the use of smart phones instead of the typical cell phones. As this level requires all these resources, studies, cost, and effort not a lot of companies may reach it.

Level Four

| Degree of Change | Investment amount | Risk |
|--------------------|-------------------|----------------|
| Change a lifestyle | Un predictable | Highest levels |

This is the highest level of innovation. Examples on this level include inventions that people did not know they needed (Hempel, 2007), such as aircraft, the television and radio, internet, and cell phones. This level requires top management to believe in the abilities of its employees to change a whole lifestyle. Although it comes with high levels of risk, it takes a lot of energy and desire to innovate. The challenge at this level is that management should evaluate the amount of resources and time

such innovation may require, and whether the company can afford it without threatening its survival.

After describing the four levels of innovation, Miner (2010) highlights four key points for companies to recognize where they stand on the scale of innovation before they begin to innovate more:

- The first point is that innovation requires the honest self-assessment of the company's abilities, which should be in line with the company's strategic objectives and its budget. As mentioned before, the first two levels of innovation required few resources, so they mainly require management's decision to be implemented. The final two levels required a whole new environment that appreciates creative thinking.
- The second key point is to integrate innovation into the business strategy; the company's senior management should plant innovation in the structure and empower its employees to think outside the box by providing them with all necessary resources, such as budget, time, leadership, and marketing.
- The third key point is to reward innovation by offering monetary awards, fewer restriction and freedom to innovate more.
- The final key point to consider is that innovation captures people; especially during the recession where companies are trying to survive. They pretend to be innovative companies as it means they can adapt to new market needs. In fact this "pretending" forces executives to put a plan in place for innovating certain products or services.

From another point of view, Hines et al. (2010) explains that innovation has only three levels, and deciding which level a firm wishes to achieve depends on the tools provided, as the chosen level will imply the level of complexity the process of innovation implementation will have. The three levels are as shown in Figure 4.

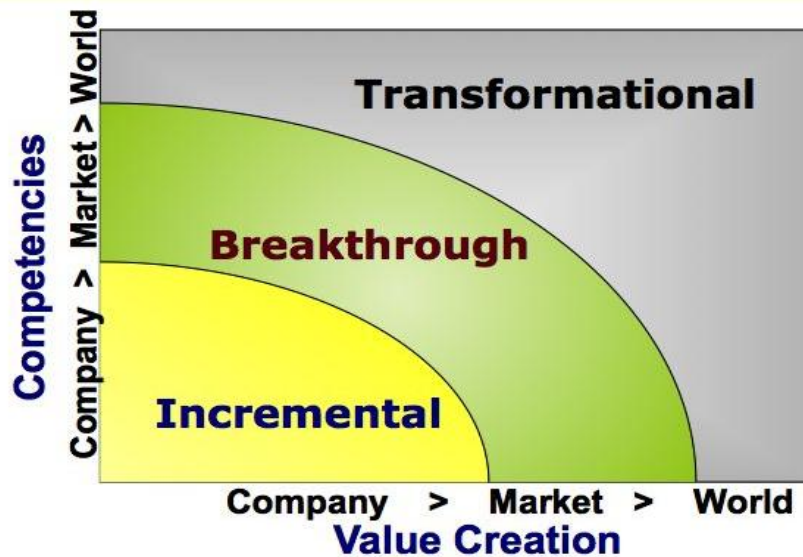


Figure 3.4: Levels of innovations desired (Adopted from Hines et al., 2010).

Level One: Incremental Innovation

This level involves the improvement or change of an existing product or service, such as the new packaging of a known product, or new flavour. This level is needed to maintain a profit and, more importantly, to keep the customer loyal to the product or service by continuously offering new ideas.

Level Two: Breakthrough Innovation

At this level customers are given something new to experience. Breakthrough innovation allows a temporary competitive advantage in which a company may rise above competitors, but only for a period of time until competitors learn how to replicate the product or service. This level requires capital, and is chaotic.

Level Three: Transformational Innovation

The final level is known as transformational innovation, as it involves a brand new product or service that transforms the way people live or do things. This type is equal to level four, as mentioned by Miner (2010) earlier. Transformational innovation may cause the vanishing of some industries or at least their transfer. Usually such an innovation comes from new companies, as they are not committed or forced to follow old static ways or a certain set of rules. Hence, it is a rare occurrence, and it is worth mentioning that by pursuing this level of innovation on its own, a company will not survive.

Finally, it is recommended by Hines (2010) that a company should pursue not one but two of the three innovation levels at least. In response to all that has been stated regarding levels of innovation, aware and experienced management is highly desirable. This leads to the next section.

3.3 Champions of Innovation Management

Again, one of the objectives in this research is to understand the process of innovation in order to identify the challenges facing its champions. In earlier sections, a clear idea was formed of innovation, including what it is and what its levels are. In this section, management of innovation is discussed, showing the main challenges faced.

Nowadays, the title of chief innovation officer (CIO) is given to the person responsible for generating a common language of innovation throughout a firm. He is responsible for figuring out how to release creativity from the innovation structure and manage the learning process of the organization. Innovation is as much cultural as it is technical, and it was found that those who treat innovation as any other function in industry and recruit people for its vacancies, are more successful and tend to bear profitable innovations.

Hauschildt and Kirchmann (2001) explain that management of innovation is a challenge and it requires individuals – champions – who support, protect, resolve conflicts, and stick with it to the end. There are three approaches for innovation management. The first, presented by Eberhard Witte in 1973, is that innovation management requires two individuals, in the forms of the “technology promoter” and the “power promoter”. The second approach, first presented by Chakrabarti and Hauschildt in 1989, states that the management of innovation processes requires a further third individual, known as the “process promoter”. Finally, the third approach states that the process of innovation needs to be managed by four individuals, with the addition of a “relations promoter”. This approach was first presented by Gemünden and Walter in 1995.

The technology promoter has the know-how and he/she helps in educating others about an innovation. The power promoter has power to force and halt opposition to innovation. The process promoter is needed when the innovation is complex as he/she co-ordinates and manages the process. Lastly, the relations promoter is needed when an innovation may further develop to a venture.

Another part of innovation management is making sure that there are benefits to be gained, and this is done through accomplishing the following objectives (Ling et al. 2007):

- Resolving a specific difficulty.
- Gaining senior management interest in the idea.
- Forming a team and organizing it to implement the idea.
- Training provisions for the client on how to deal with the newly implemented idea.

What follows is a demonstration of what was written and discussed in this chapter. It is worth noting here that the circles are linked to what women can provide in the previous and later chapters. Innovation challenges in construction will be presented later in chapter 5.

3.4 Summary

Innovation may be the fourth project performance's component after quality, time, and cost. Therefore, recognizing the level of innovation for each firm is essential. As stated earlier, this is done by conducting an honest self-assessment, considering whether or not an innovation is integrated into the corporate strategy, as well as taking into consideration the willingness to allocate resources for it. What has been previously discussed can be summarized in the following figure.

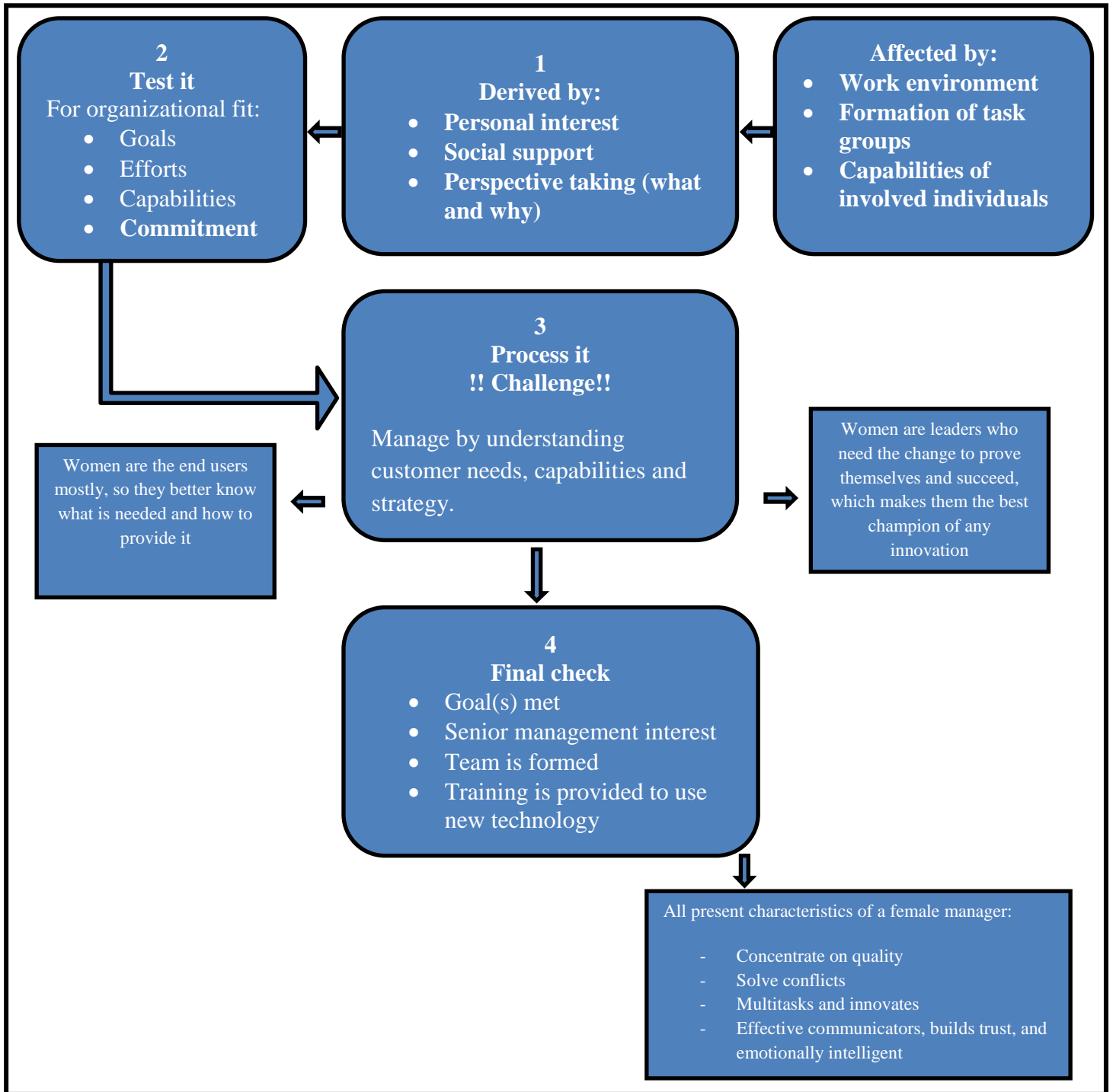


Figure 3.5: Innovation in general with relation to women abilities (Summary).

As this paper is concerned with the construction sector, innovation is studied through that particular lens in the following chapter, in a bid to link the previous chapters together.

Chapter 4

Innovation in Construction

This chapter highlights the main aspects in the topic of innovation in construction, linking innovation to the construction sector in an attempt to fulfill the fourth objective. It was mentioned in the introductory chapter that research has been carried out by many scholars (Tatum, 1986, Slaughter, 1993, Dulaimi 2002, Euchner and Henderson, 2011) about innovation definition, its flow to construction, innovation process management and its effect on the structure of the construction industry.

This chapter will present literature about construction innovation, shedding particular light on some previously discussed points relating them to the nature of the construction industry, such as the innovation process, its sources and features.

Innovation in construction is defined by CERF (2000) as:

“the act of introducing and using new ideas, technologies, products and/or processes aimed at solving problems, viewing things differently, improving efficiency and effectiveness, or enhancing standards of living.” (p.2).

Defining innovation in construction, as firms see it, is the “purposeful search for new knowledge” and its application in executing projects (Na et al., 2006). Another definition of innovation is the adoption of new and/or advanced technology and practices (Manley and Mcfallan, 2006). Thomas and Bone (2000) highlight the main areas of innovation in construction which, in their opinion, enhance quality and value. These areas are technical innovation, value and risk management, and supply chain management and partnering.

It is worth mentioning that the type of innovation selected is strongly related to the goals, strategy, weaknesses and strengths, along with the environmental factors of a company (Dikmen et al., 2005).

4.1. Drivers of Innovation in Construction

The construction industry has witnessed noticeable progress in innovation, which is due to the right selection of the necessary types and sources of innovation for each project. Also useful is the collaboration between individual and multiple enterprises, and collective research and development (R&D), as Pries and Dorée (2005) mention in their quantitative study on Dutch companies. They also found that

the reason for this progress may also be accredited to the fact that projects are smaller nowadays, so the focus on innovation has increased, in addition to the regulations putting pressure on the industry to become innovative. Figure 5 shows the average number of innovations documented in Dutch companies over the last years.

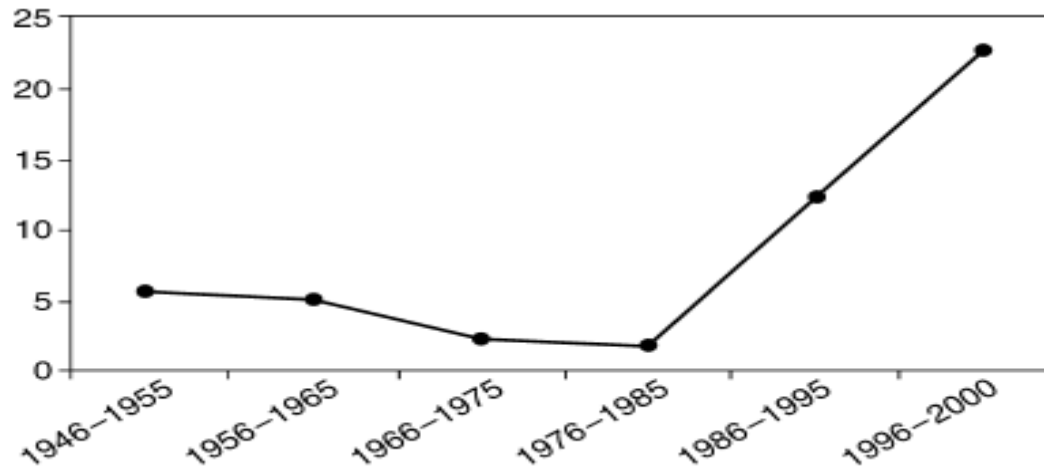


Figure 4.1: Average documented innovations in construction industry in the Netherlands (Adopted from Pries and Dorée 2005, P.563).

Innovation can also be driven by clients, in addition to the aforementioned causes and sources of innovation in construction. They can demand it by offering profit incentives, benefitting society in the long run, and inevitably requiring government participation as a result (Na et al., 2006). Lim et al. (2010) agree with this, as they state that the customer's willingness to pay for innovative products is the key factor in determining the degree of competitive advantage a company might attain. Table 1 shows this factor, among others, in a comparison between innovative practices in manufacturing and construction.

| Factor | Manufacturing | Construction |
|--|---|--|
| Investments in innovation | Innovation serves as a means of developing and sustaining core competencies in manufacturing enterprises | Innovation investment is hindered by the intense cost competition faced by the construction industry |
| Profitability of innovation | Profit is an important driver of innovation | The low profit margins received by construction firms deem investments in innovation an improbable strategy |
| Scope of innovation | Firms' scope of innovation is influenced by the product's ability to achieve first mover advantage and satisfaction of consumer's needs | Firms' scope of innovation is influenced by productivity and quality demands of clients |
| Innovative capabilities | Manufacturing firms' innovative capabilities reside in management's ability to consolidate corporate wide technologies and production skills into competencies that empower the firm to adapt quickly to changing opportunities (Prahalad and Hamel 1990) | Due to the liability of separation there is a tendency to reinvent processes on each new project and some of the detailed technical activities performed on one project may be difficult or impossible to transfer to new projects |
| Consumers' willingness to pay for innovation | Technology push: firms are often focused on technological novelty to capture consumers' demands | Market pull: firms are often focused on clients' requirements of low cost and high quality aspects of the end product |
| Competitive advantage | Innovation provides firms with possible reactive strategies to prevent losing market share or proactive strategies to gain a strategic market position relative to their competitors (Linde and Porter 1995) and possibly improve profitability | The intense cost competition of the industry drives construction firms to move away from the need to differentiate themselves in terms of technological capabilities toward differentiation in terms of costs |

Table 4.1: Comparison between innovative practices in manufacturing sector and the construction sector (Adopted from: Lim et al. 2010, p.572).

Proper co-ordination with and between the client, contractor, consultant and suppliers, as well as understanding the market, helps construction companies break through the static context of the industry (Reichstein et al., 2008). In spite of the fact that close relationships with clients trigger low-level innovations, it is more innovative to collaborate with other contractors in the supply chain of services for a particular – or group of – projects. Even more important is to recruit highly educated employees (Bröchner, 2010), concluded from studies which proved that having a workforce like that is linked to non-technological innovation (Bröchner, 2010).

On the other hand, Clients tend to choose tenders based on the lowest price, which makes it unfeasible for contractors to include the cost of innovation (Lim et al., 2010). Because innovation is seen as a weak competitive tool for direct profit, contractors manipulate the innovations that customers and client's desire, and that reduces the cost of construction to build their own competitive advantage (Lim et al., 2010). The fact that having extraordinary profits is an incentive for undertaking innovation in projects, as stated by Schumpeter (1934, cited in Elgar 2005), contradicts with the actual situation of innovation in construction. Consider the sustainable buildings which are an example of innovation in the construction industry. These generally offer less profit than traditional buildings, hence contractors tend to

only fulfill the minimum requirements that they are forced to implement by government regulations (Elgar, 2005).

It is advised that they have to create improvements in quality that increase the customer's willingness to pay for the innovative product. By doing so, the firm is creating its own branded products that will improve their productivity in time, and the product will drain less cost and time, creating a sustainable competitive advantage (Lim et al., 2010). Therefore, contractors or construction firms have to manage their innovation in a way that best suits their competitive market. In other words, although including innovation cost as direct cost in quotations will eliminate the chance of winning a project – as the market is highly price competitive – it is recommended that firms should invest in innovation, as it might enhance competitive performance and perhaps reduce construction costs and the period of execution.

What shape innovation in Elgar's (2005) opinion are corporate governance and inter-organizational relations. The former includes the strategy of the company, its goals, vision, targets, and rules. The latter includes the relations between the employees and top management, amongst employees themselves (which implies communication feedback), and knowledge sharing. The outcome is that by adopting a system for innovating longer-term strategic visions, risk management, putting the right person in the right place, and establishing a flexible organizational structure, the integration of the decision making process will flourish (Barrett and Sexton, 2006).

Some scholars argue that drivers of innovation in construction can be placed into two categories:

→ Market-based view: firms need to keep being updated with the rapidly changing market to sense the events that fuel or hinder innovations (Zahra, 1991).

Although market opportunities are vital, they are not enough alone, it is not a strong base to innovate for rapidly changing market, so we have the:

→ Resource-based view: the resources a company has form a more stable context in which innovation can be developed to create its own market (Andreu and Ciborra, 1996).

These two categories coupled together present an even better view:

- Coupled view: innovation needs both market pull and technological push because each cannot control the other's factors unassisted (Dosi and Malerba, 1996).

It is also worth mentioning that by Park et al. (2004), who found that the role of individuals participating in an innovation was rarely discussed in literature, came up with a model that presents the factors responsible for deriving innovation in the construction – contracting, in particular – sector. The factors are:

- Normative pressure : applied by the project manager through his championing behavior.
- Instrumental motivation: of the team members enabled by an encouraging organizational climate.

4.2. Types of Innovation in Construction

The last section aimed at defining innovation in construction industry, its drivers and benefits, forming the basic background needed to understand the nature of the industry and how it reacts towards innovations that may be proposed and managed by both genders. Gender issue was discussed in chapter 2 and will be considered again in the coming chapters. Returning to the point that profit maximizing is the major driving force of innovation for contractors, Lim and Ofori (2007) have classified innovation in accordance with what each type offers in return, making innovation a worthwhile endeavour for contractors. This approach also guides the development of innovation strategies. Classification is not based on process or product innovation, but on improvement that is needed for strategic decision making. The three classes (Appendix: Table 4.2) are:

- I. Innovations clients are willing to pay for
- II. Innovations that reduce construction costs
- III. Innovations that have intangible benefits, the offering competitive advantage for the company.

Another classification based on knowledge is presented by Lu and Sexton (2006).

- I. Exploitative innovation: prepare a general frame to improve the efficiency of operations and enhance capabilities for future projects.

- II. Explorative innovation: is encouraged when solving a project-related problem where research, experimentation, and problem solving skills are required, especially with new projects.

These two types should be balanced to create a sustainable competitive advantage.

Simply put, it is said that there are two types of innovation: one is technological that includes process and product innovations, and the second organizational including practice and managerial innovations (Manley et al., 2009). This is similar to Jaskyte's (2011) opinion, who claims that innovation is divided into two types: administrative and technological. Administrative innovation is a top-down innovation that includes rules, regulations and procedures, such as resolving conflicts and forming boards. Technological innovation, on the other hand, is a bottom-up innovation that includes new ideas for a product, new execution methods, and so on. To guarantee the results of such innovations, Jaskyte (2011) recommends having a transformational leader because of he/she will be future-oriented, encouraging thinking outside of the box, dynamic and able motivate employees to be leaders themselves.

Another type is open innovation, which has been defined by Lichtenthaler (2011) as absorbing and implementing not only the ideas developed internally, but also from external sources in order to benefit and expand. In other words, it is the increased interaction amongst and across sectors, pursuing new concepts, ideas and knowledge sharing. Lichtenthaler (2011) states that it is hard to implement open innovation because capturing the value from it is dependent on the firms' capabilities, which have to improve in order to manage – and avoid the risks of – open innovation. However, this type of innovation is sustainable and beneficial. A further type is what Von-Hippel (2005) calls “Democratization of innovation”, that is involving the customers in the process of innovation. He suggests that as users are becoming more sophisticated and demanding customers, they should be actively involved in the process by giving their own different suggestions for solving problems.

4.3 Process of Innovation in Construction

Innovation is vital for a country's economic growth. The construction industry is the creator of buildings and structures where other sectors develop and work, affecting national economic growth. For that, leaders in construction firms should pursue systemizing innovation through research and development (R&D), as it also affects the competitiveness of the industry (Pellicer et al., 2010).

According to Sundbo (1998), all that has been written over the years on managing innovation has only focused on the management of innovative projects, and they can all be placed into two categories: The first is the rational school of innovative process that considers innovation as linear, with multiple stages (CERF, 2000). However, it is inaccurate in describing knowledge diffusion, learning, sharing and feedback in the unpredictable environment of the construction industry. And so, the second category is manifested. The behavioral school of innovation process couples the first school with the uncertainties of organizational realities, as most of the time changes are occurring rapidly in project-based sectors. Thus, this school concluded that innovation process is chaotic and needs to be controlled (Quinn, 1985). Seconding the latter school are Barrett and Sexton (2006) who illustrate that the innovation process is a cycle of a behavioral nature. Firstly, the innovation has to be diagnosed by sensing the market needs for certain innovation. Secondly, action has to be planned as it is a chaotic action-reaction process, controlled daily as innovation is competing with daily variability in resources, workload and time. Then an action is implemented, and finally feedback has to be presented and documented to evaluate the situation and form a knowledge base. (Figure 6).

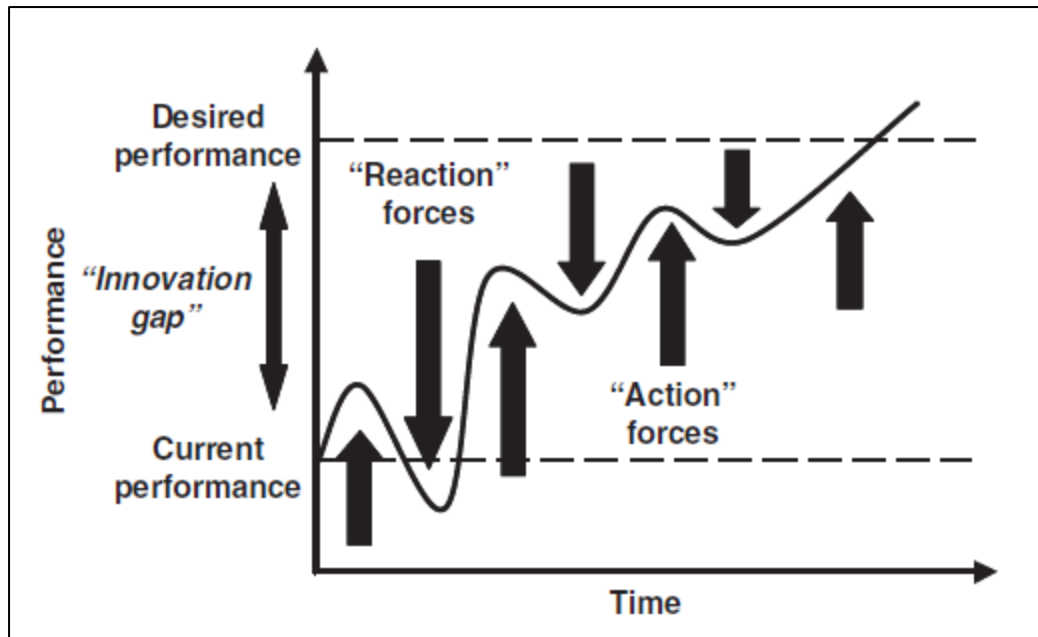


Figure 4.2: Innovation process is an action and reaction process (Adopted from Barrett and Sexton 2006, p. 342).

An innovation process is affected by many factors in construction companies, and if those factors are interacting in balance then performance may be enhanced (Pellicer et al., 2010). Some of these factors include:

- Stakeholders (consultant, contractor, R&D, client, customer, and so on.)
- Availability of skilled workforce.
- Industry culture.
- Access to loans.
- Innovation rights protection regulations.
- Environment, Health and safety regulations.
- High national and international competitive pressure.
- Demand for new infrastructure types.

4.4 Distinguished Innovation

Manley and Mcfallan (2006) highlight the factors that make certain companies innovate more than others.

These factors involve:

- Hiring new graduates (i.e. Know AutoCAD).
- Introducing new technology (i.e. 3D AutoCAD).
- Enhancing technical capabilities (i.e. 2D to 3D).

- Encouraging new ideas from employees.
- Undertaking R&D.

Examples of some innovative technologies and practices are shown in Appendix: Tables 3 and 4. Add to these two tables the example of Mohamed and Abourizk (2005) who showed application of the theory of inventive problem solving (TRIZ) in a construction project (Tunnel). This theory establishes solutions for structural/technical problems based on data entered into software. These solutions might occasionally be better than those made by humans. This application is also an example of benchmarking. Performance of innovation may be affected by different organizational strategies. According to Manley et al. (2009) these strategies are the ones concerned with employees, marketing, technology, knowledge and relationships. Manley et al. (2009) found that some, though not all, of these strategies make highly innovative firms stand out, and this is mentioned before recruiting new graduates, partnering and venturing, along with emphasizing knowledge sharing, investment in R&D, and keeping updated with premium practices globally.

4.5 Hardships

When thinking to innovate, construction firms face different liabilities, as Reichstein et al. (2005) explain. The first is that the final product when built is fixed in its location of consumption, so the opportunity to improve it and benefit from its experience is limited. This is called the “liability of immobility”. The second is the “liability of projects”. The nature of construction is project-based, meaning that when a project is being executed, a team is formed for a specific period of time, and is disbanded after the period, leaving it hard to share the lessons learned with probably no feedback for coming projects or for other new teams formed afterwards (Winch, 1999). Even if said lessons were shared, projects are frequently dissimilar, and what works for one often does not work for the others. Thirdly, “liability of uncertain demand”. In this the project’s stakeholders – client, architecture, contractor, users, and so on. – are the ones who shape the final product, limiting the influence construction firms have over their own future market.

Fourthly is the “liability of separation”. As clients seek quotations for their future projects, including structural, architectural, and mechanical works, their cost

consultants' procurement process chooses those that bid best. By this stage they have selected the design and production team, which now has to create communication channels to deal with different parties in the project, creating the problems of miscommunication and lack of feedback throughout the multi-stages of the project. For this liability, the design and build contract or long term service contract present a solution. The fifth liability is "liability of assembly". It is not easy to assemble the works of different parties together such as structure, consultant, and production, which may ruin any innovation. The sixth and final liability is "liability of smallness", as it was found that most contracting firms are small, lacking professional staff and skilled labourers, creating less competition nationally and none globally. Given that size is important in shaping the capabilities of a company, it can be said that small firms will likely be less innovative than larger firms (Reichstein et al., 2008).

From the other side, market nature influences innovation possibilities even though the industry is not open to its external environment in the same way as the manufacturing industry is. It was concluded from this study that lack of innovation leads some companies to give less attention to the factors hindering it.

4.6 Innovation Champions

Dulaimi et al. (2005) argue that the construction sector is highly resistant to innovations. Hence, it needs champions/Promoters. They emphasize that the champion must be the project manager himself. He should be the one to plan and implement projects innovatively with the help of the senior management, who in turn provide him with the required resources, authority, and support for the innovation being implemented. Moreover, the management should foster an organizational culture that nurtures and encourage innovation. This culture will enhance projects' performance and gain a competitive advantage over others, since it is known that in the construction industry innovation happens during the execution of projects (Dulaimi et al., 2005). Leiringer and Cardellino (2008) investigated innovation champions' strategies and the surprising factor that triggered innovation in them is merely the fear of being fired from the job. A table (Table 5) showing the champions' positions and what the innovation was, is presented below.

| Case | General description of company and innovation | Innovation champion |
|------------------------------|--|---|
| <i>External FM providers</i> | | |
| Case 1 | A management company established to provide an integrated range of products in facilities management, project management and facilities consultancy. The innovation consisted of the development of a health and safety management and audit tool. The ultimate aim was to combine the tool with the further development of technology software, which would allow facilities managers to work in a more systematic manner. | The identified innovation champion is the managing director of the company. |
| Case 2 | The company among other things provides project delivery, building maintenance and relocation management services to their clients. The innovation involved the development of an electronic management portal. The overall aim with the portal was to enable a more efficient and collaborative way of working that would not impede the specific statutory and operational requirements of clients. | The managing director and the operations director of the company, both present in the interview, identified themselves as innovation champions. |
| Case 3 | A company that provides construction, maintenance, joinery and mechanical services. The innovation in question was the development of a system allowing for the provision of a partnered full open book accounting service. | The innovation champion is the managing director of the company. |
| Case 4 | The company provides cleaning services to a wide range of clients. The innovation involved the development of an internal 'passport scheme' and the employment of a local college to hold a weekly English class for staff. In particular, focus was put on getting the blue collar workers to take pride and responsibility for the work they undertake. | The innovation champion is the general manager for the UK operations. |
| <i>In-house FM</i> | | |
| Case 5 | A large company active in the defence sector. The innovation consisted of the development of a 'facilities whole life cost model' that estimates the life of the building components. In particular, the individual components impact on the overall life cycle of the building from the empty site through to occupancy, demolition and beyond. The tool takes into account the sustainability and cost of each component and from this information it ascertains the future maintenance costs. | The innovation champion is the head of facilities management in one of the business areas. |
| Case 6 | The company provides communication solutions serving customers all over the world. The innovation consists of the development and implementation of a survey tool that investigates employees' perceived dissatisfaction of their working environment. The aim of the survey tool is to ascertain a thorough understanding of the employees' perception of their workplace and in this way provide a mechanism to redress feelings of dissatisfaction. | The head of property services was assigned to champion the new idea. |
| Case 7 | A UK financial organization with a worldwide presence. The innovation consists of the development of a global engineering standard manual that can be implemented in any facility around the world. It makes use of a standard set of engineering terms on the subject of power management and data centre management to create the manuals. The aim was to create the same standard across the board to make the global facilities easier to operate. | The innovation champion is the global head of engineering within the FM group. |

Table 4.5: Cases of innovation champions studied by Leiringer and Cardellino (2008, p.1047)

A rather surprising opinion is that of Bessant (2005): innovation is happening in a lot of aspects across the construction industry, starting with using technologies in assembly, fabrication and prototyping, to organizational managerial innovative

practices, risk management and sharing system integration through the usage of a smart range of materials. It can be said that the industry nowadays possesses the basics of the evolving practice of innovation management, especially in knowledge sharing between projects, which is influencing the previously key players in this area in the manufacturing industry (Bessant, 2005). Correspondingly, Miozzo and Ivory (2000) claim that the construction industry is not “unchangeable”, as was formerly suggested. They argue that new technologies are being adopted as well as management practices, designs, supply chains, changes in equipment, and materials used.

However, they are not encouraging this change because with time, they think, it will create conflicts that will adversely affect innovation. Pavitt (1984) considers that construction firms are oriented by suppliers. They do not have to innovate in order to remain viable, as was mentioned by Hamm and Slywotzky (2009). Instead they only need to sustain their positions by fulfilling the needs of the market and customers with respect to governmental regulations (Reichstein et al. 2005). For that, the authorities should encourage innovation in construction by providing a profitable social requirement for improved construction productivity and quality (Na et al., 2006). It is fair to state that because of the long life cycle of the construction products and the risks of errors to lives, regulations are needed to ensure structural safety and to force good working practice (Reichstein et al. 2008). Furthermore, a national body should be formed to unify different construction institutions and individuals and prepare an agenda or plan for the industry innovation (Lim et al., 2007).

Finally, it is worth mentioning that for developing countries, innovated technologies working outside may not be applicable or may not succeed, because of the change-resistant culture, opposed to knowledge sharing and the high costs necessary to implement any innovative technology (Taylor and Francis, 2002). The starting point ought to be recruiting new graduates who hopefully have the innovative mentality required for the developing countries cultural change. Hence, the question is whether or not today's engineering graduates are capable and innovative enough to take us a new level? (Galloway, 2004).

This chapter has presented literature on innovation within the construction sector specifically, regardless of the differences in gender, location, capabilities, resources

and culture. As the issue surrounding gender was discussed in chapter 2, it will be linked to construction in the following chapter.

4.7 Summary

As was stated earlier, innovation in construction might be in the following areas:

- Value and risk management.
- Supply chain management.
- Partnering.
- During execution of projects.

What has been discussed previously can be summarized in the figure below.

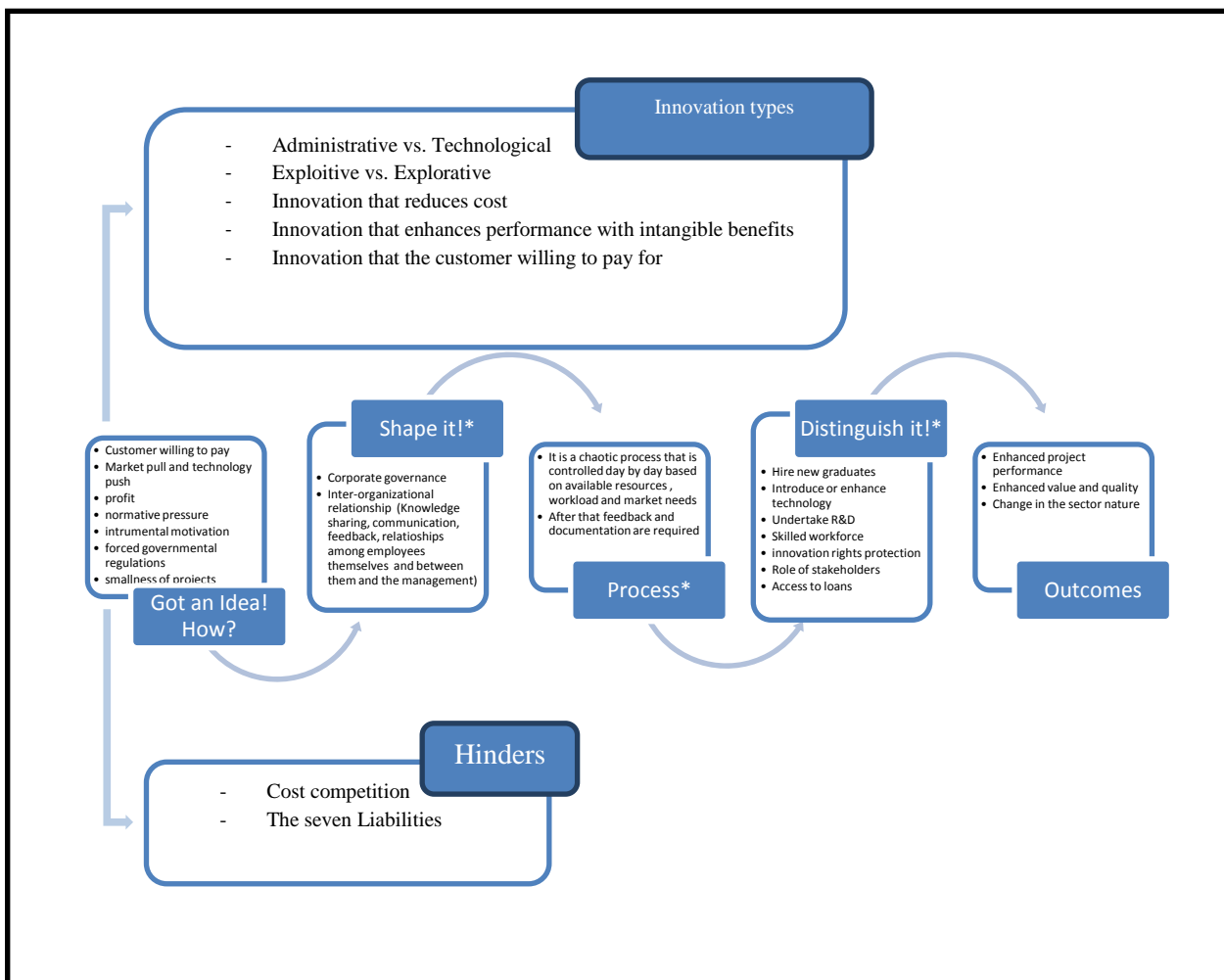


Figure 4.3: Innovation in construction (Summary).

*It is the role of innovation champion (PM) with the characteristics of a transformational leader with authority and support from the organization to lead this process.

Chapter 5

Women in Construction

This chapter contributes to the third and fourth objectives. To the third by investigating the challenges and barriers that women have to overcome to grow and progress in the construction field and the fourth by investigating what women may add to the innovation in this sector.

5.1 Overview

The construction sector is known to be male-dominated (Watts, 2007). This industry requires long working hours, skills to interact with the different attitudes of co-workers, conflict management, and patience, as yelling often becomes the only means of communication on site.

To start this chapter, it needed to be said that – as mentioned in Chapter 2 – the number of women entering the workforce has been increasing recently. This later participation is due to the socio-cultural environment in the UAE, as Omair (2010) claims, besides the fact that gender-discrimination is a factor in making decisions about performance evaluating, recruitment, and raises (Rhode and Kellerman, 2007). As evidence, Kirchmeyer (2002) states that male managers are frequently better paid than their female counterparts. The progress made was a direct result of governmental rules and regulations that forced organizations to recruit women, and provided them with equal rights.

The following section will explain these barriers in more detail, and then some suggested solutions are will be presented. The final section sheds light on innovation as a fruit of having women in the industry as they bring in new way of thinking.

5.2 Barriers

In order to better understand the lack of women in construction, the choice women make to enter a specific sector is studied by Abdulla et al. (2011), who conducted another study in the UAE regarding the effects of demographics and environmental factors on job satisfaction. They formulated some factors affecting the job choice for a woman starting her career path. In other words, why the construction

sector is not an appealing sector to them. These factors are from the women's point of view:

- Salary and Incentives: the main issues in attaining satisfaction.
- Relationship with coworkers and Supervision.
- Public perception: the UAE's culture that perceives the idea of a woman on a construction site as inappropriate is stressful.
- Working hours: the long hours make it hard for a woman to join as it will minimize her chance in further developing her career.
- Organization's strategy: as females are seen to delay the projects' progress, most of the policies do not lean towards recruiting women.

They concluded that if women are not entering the construction sector, it is because this job is not satisfactory, where satisfactory means fulfilling interests and being personally content within it.

Fielden et al. (2001) identify the barriers women face when entering the construction sector through research that involved focus groups from different perspectives. These barriers are:

- 1- The public image of the industry: such as being of long working hours, male-dominated sectors, phrases on television and in school used to describe the construction industry giving a bad influence or impression. The balance between work and family life (Galloway, 2004).
- 2- Terms and conditions of employment: such as women receiving lower wages than men, adverse weather conditions around the working area, and a poor health and safety record. In addition, the continuously changing nature of the industry discourages many potential candidates from coming forward to apply for a position.
- 3- Lack of role models: also limits the chances for women to foresee what they could achieve within the industry. Social influences around them also discourage the idea itself, such as family, teachers, friends, and so forth. Galloway (2004) also supports this idea.

- 4- Recruitment method: regularly when there is a vacancy, an employed man recommends a friend or a relative to work. For the company it is acceptable but for the sake of diversity and developing the industry it is not, as it not only traps the business in status quo with no fresh blood, but also limits the opportunities for women to join.
- 5- Attitudes towards women: sexism is the main barrier for women. They can do any task in site or in office, but it is not uncommon for their male peers to disagree with this fact. Some women face sexual harassment, rude language, and demeaning and threatening behavior on a regular basis, supposedly so that men can prove that they are better.
- 6- Engineering is not something with which everyone is familiar. Thus Galloway (2004) advises that to change the image of engineering in the eyes of young people, we need to first change the image of engineers themselves by teaching them non-technical skills such as management and communication. She agrees with Fielden et al. (2001) that this process of education should begin from the early stages of a person's education, so that when growing up, they are gradually taught what it is and how it contributes to society.

Besides Fielden et al. (2001) and Abdulla et al. (2011), Etzkowitz et al. (2010) investigated the reasons why women are not usually allowed to be involved in the practice of the science and technology sectors, which includes construction and engineering. They discovered that the barriers stopping women are: the balance between work and life – as working hours are long, social barriers such as relatives' comments, and the organizational environment in which they have to work as they deal with the inappropriate attitudes of male peers. For some companies, Fielden et al. (2001) also found that the trouble of having female employees prevents them from hiring them since they are unreliable, as they have families to take care of, are costly, and need maternity leave.

Galloway (2004) said about including women in engineering:

“We as engineering societies have an opportunity to work together as partners, as one voice to better our profession and to capture the intellectual capital that is standing at our door step.”

(p.132).

5.3 Solutions

On the other hand, Fielden et al. (2001, pp.304) state that the “construction industry is under pressure to improve its performance in equal opportunities.” As women are the end users of most of the products, they should be more involved in the process. Therefore, women themselves should improve their interpersonal skills such as values, planning, documentation, reporting, conflict management, as well as communication skills with laborers, clients, and any party that has a stake in the projects they are responsible for. If those are not mastered by a woman, her failure at her job in the opinion of her colleagues will be due to the fact that she is a woman, and not to the fact that she is not an efficient engineer/project manager. Song and Gale (2007) illustrate that the work values of a project manager present a major advantage for him in making decisions when other dimensions – Experience, knowledge and personal attitude – are unclear. They added that these values may present a part of the competence advantage of the project manager, which in turn may attract other employers to recruit him/her.

Fieldman et al. (2001) recommend starting an initiative for establishing equal opportunities in the industry by:

- 1- Raising knowledge of the construction industry in young females from school by educating them about construction and its qualifications, what to expect and how to get involved.
- 2- Providing training for those who are newly entering the sector and those who intend to develop their skills and boost their wages.
- 3- Providing employment opportunities by increasing the percentage of women in company departments such as quality survey, planning, and human resources, in a bid to create role models.
- 4- Offering flexible working hours if possible by the company, with respect to the projects’ contract deadlines.

- 5- Providing facilities for children.
- 6- Providing equal opportunities in every aspect in the workplace so that a change in attitudes towards women is encouraged.
- 7- Involving women in government bodies so that they can make decisions in the construction industry.

A good example of encouraging women to face barriers can be found in the United Kingdom (Lu and Sexton, 2010). In construction companies, men and women were distributed in a way that men were placed on projects' sites and women in the head offices working in planning, documenting, and other paperwork. The government also forced construction companies to offer equal opportunities in every aspect of the job, including incentives, pay, and promotions. Moreover, it emphasized making the industry appealing to women, so that they could become a role player in its improvement and development.

Another encouraging example was given by Etzkowitz et al. (2010). In India, a firm allowed women to work from home, and offered flexible working hours, as well as childcare facilities and maternity leave. However, these opportunities may not be attractive for some women because this may lead to insecurity in their jobs, reduced pay, no bonus, and no overtime (Baruah, 2004). Another example comes from a 2008 article on JETS and Motorola announcing that Motorola gave a grant of \$50,000 to Junior Engineering Technical Society (JETS) to encourage women to learn about – and how to be a part of – the construction sector. Finally, Swersky et al. (2006) cite that The Commonwealth Institute (TCI) was founded to support women who are starting or expanding a business. It is a non-profit organization that aims to liberate female power to change the image of business. This organization provides a step towards achieving what Galloway (2004) and Fielden et al. (2001) have been recommending.

As a result of these efforts, in their study, Lussier and Rinfret (2002) show that in organizations with fifteen per cent of women in the board or in senior management positions, men tend to show more trust in female leaders, compared with no trust in those organizations that have less than fifteen per cent, or even no inclusion of women. On the other hand, though men have considerably more appreciation for

women when they present a larger number, women's confidence in themselves is extraordinary, regardless of their numbers.

A good example of female capability comes from Ford automobiles as presented by Burke and Mattis (2005), when they manufactured a minivan that targeted families. But it did not satisfy family needs and they received complaints. In response, they decided to recruit a woman, especially, to lead a team and put together a minivan that satisfied the needs of mothers and children. It was because men had no experience in such things and women are usually the end-users; add to this that the work force at Ford was not diverse enough. Hence, including women, disabled people, and minorities will enrich the construction industry and help improve the public image, and over time innovation will make the industry catch up to other fast-growing industries in this complex world.

5.4 Women and Innovation:

Nowadays, the number of women is increasing in society, which should be reflected in workforce diversity. This diversity drives in different perspectives, ideas, ways of decision making, and consequently better performance and a competitive advantage (Galloway, 2004). As women are facing a lot of barriers on a regular basis, they become stronger and more experienced at their work, because they want to develop their career paths. Hence, if the industry needs innovation, which is hard to create, they are capable of mastering it. Furthermore, they are capable of enhancing the innovation level in the industry by applying what they have learned.

From a managerial point of view, Kwaśniewska and Nęcka (2004) argue that most female managers are convinced that innovation is a necessity for improving an organization, regardless of whether or not those women were better or worse than their male counterparts. However, these female managers reserve the right to reject any approach towards creating a climate for innovation, as giving this freedom to the employees does not enhance levels of innovation. Therefore, they do not favour a climate where freedom is a right and they are compared to males and non-managers respectively.

From another point of view, the number of women is increasing in construction according to Bremmer and Kesselring (2004), who found that as the divorce rate increases, so does the female workforce as they search for income sources to support themselves, and obviously their children too. They add that in most cases women's income overcomes men's, despite being paid less (Bremmer and Kesselring, 2004). Women want to work because life expenses and children's education are expensive. There are two possibilities for married women who want to work in construction: either to work and earn more money than their partners, thus enhancing the lives of their family. The other possibility is that there is a chance that this will lead to a divorce, as not enough time is spent with the children, or since their earnings could surpass those of their jealous partners (Bremmer and Kesselring, 2004).

Nonetheless, Miozzo and Ivory (2000) are against increasing the number of women in the industry for the same aforementioned reason of not preferring any innovation. Therefore, they suggest staying where we are as every party is benefiting from the imbalance of social and economic relations. Contrasting with them are Mueller and Dato-on (2008) who believe that the mentality has changed and social barriers have become less rigid, which led to women being more involved in the business world.

5.5 Champions' Effect on the Climate of Innovation:

It is of vital importance to discuss the impact that women have on the climate of innovation as this may enhance the innovation level in organizations, as Moore et al. (2011) found. They state in their research that women emphasize creating a climate of trust by the collaborative transformational leadership style that they adopt at work, which provides them with the power needed to succeed and progress in their career as developers of innovation climates, and as entrepreneurs. It was found by Moore et al. (2011) that women have a similar co-operative attitude to that is expected from men to encourage innovation, and they are capable of balancing both controlled performances and authoritative command, adding to it the further inspirational language and communication styles expected of a female.

Rosener (1990) notes that women define their positions, and themselves, in organizations as the ones who transform the self-interest of employees or team members into a concern of the organization. They also define their job as assessing other colleagues in enhancing performance and achieving set goals (Paris et al., 2009). Hence, Neilsen and Huse (2010) concluded that women use a participative style of leadership. They concentrate on sharing power and knowledge and having active communication channels, assuring a positive climate for innovation (Madlock, 2008).

However, this requires that the employees be trustworthy and adjust the perception they have formulated from their previous experiences with managers (Drath et al., 2008). When they see the leader as a believer and promoter reflecting their trustworthy attitudes, they will perceive the justice of the organization more (Brockner et al., 2007). This in turn will result in increased loyalty and commitment, job satisfaction, and unrestricted knowledge sharing that will yield better performance and decision making (Morrison and Robinson, 1997). The trust climate built by women has many benefits that directly affect organizational value (Mayer and Gavin, 2005). According to Neves and Caetano (2006) it improves efficiency and productivity, decreases absence and employees rate of turnover, more commitment and improved safety records. Not to forget knowledge gaining and sharing as a result of the trust, opening doors for special and extraordinarily beneficial innovations (Madhok, 2006).

5.6 Organization's Role in Creating Climate of Innovation:

The organizational climate of innovation is defined here as James et al. (1990) describe it. It is the individual expectation of what an organization perceives as an innovation with potential benefits.

Hawell (2005, p.115) concludes a seven steps process within which any organization can "breed rather than block potential innovators". These steps involve:

- 1- Recruiting individuals with creative potentials and initiative with enterprising quality, and cultivate them.

- 2- Training them to develop skills of how to frame ideas, build, link to goals and presentation, rather than only pointing out their mistakes or simply neglecting them.
- 3- Mentoring, connecting them with influential people, supporting them and protecting them from “political infighting”. In return they will consider the organizational interests above their own and treat their relationship with others with more respect.
- 4- Allowing them to volunteer for any project they like, in this way they will be committed to it and excel more.
- 5- Rewarding and Acknowledging innovations by for example, offering pay for a potential idea.
- 6- Understanding that failure presents a learning opportunity.
- 7- “Raise the profile of champions” by letting them take the credit. For example, inviting them to present the idea to the board.

5.7 Role of Innovation Champion in Creating and Enhancing the Climate:

As within the construction sector the project manager is the one on site implementing the project, he is considered the innovation champion, as discussed in the previous chapter. According to Park et al. (2004), an innovation champion should be capable of firstly managing and combining the creativity of project team members, and facilitating their progress in ideas-generation. Secondly, she can persuade and sell innovative ideas to prospective allies and gain their support and approval. Thirdly, she can incorporate information and inspire individuals to work together to create original ideas. Last but not least, she can embrace and implement new ideas on projects.

Whether these four capabilities determine the success or failure of an innovation champion is an issue discussed by Hawell (2005). He studied seventy-two innovations in thirty-eight companies to answer the question of: what makes innovation champion succeed or fail in making the innovation beneficial? He found that “effective” champions are distinguished by, in his own words (p.108):

- 1- “Conveying confidence and enthusiasm about the innovation”: by combining their innovation with the organizations’ goals such as profitability, enhanced reputation and strategic advantage.

- 2- “Enlisting the support and involvement of key stakeholders”: by analyzing their interest and modifying the selling strategy to be maximally convincing.
- 3- “Persisting in the face of adversity”

They depend –for getting ideas and opportunities- on their connections in and out of the organization.

Hawell (2005, P.108) also points out that such champions are different from “ineffective” champions by their personal characteristics and behavior in the way they identify and promote innovation to gain the needed support to bring ideas to life as products or services. In addition to these characteristics of champions, Jenssen and Jørgensen (2004, p.79) claim that a champion should have the following characteristics:

| Champions characteristics | |
|---------------------------------|--|
| Personal characteristics | <ul style="list-style-type: none"> - socially independent - politically clever - self-confidence - risk taker - charisma - energetic and enthusiastic - the ability to inspire, to stimulate intellectually, and to assess individuals - persistent - flexible - socially, professionally and managerial skilled |
| Experience | <ul style="list-style-type: none"> - long and varied experience in the same company - knowledge of the particular trade - high-ranking job |
| Position in network | <ul style="list-style-type: none"> - many weak and strong ties |

Table 5.1: Champions characteristics (Adopted from Jenssen and Jørgensen, 2004) mentioned.

In summary, innovation in construction needs (Park et al. (2004) :

| From Champions | From Organization |
|--|---|
| <ul style="list-style-type: none"> - Understanding of the dynamics of innovation process - Supporting the team members by facilitating not pressurizing - Choose a leadership style that fits the situation he is in - Understand the project environment and the team members willingness | <ul style="list-style-type: none"> - Value innovation and Understand how it is motivated - Facilitate innovation by offering: <ol style="list-style-type: none"> i. Autonomy for PMs and decision authority ii. Sustained support by providing the team with adequate resources on site to foster innovation such as funds, materials, time and personnel. iii. View change as opportunity not risk iv. Reward and Acknowledge |

Table 5.2: what Innovation in construction needs from both the organization and the champions.

5.7.1 Enhancing the climate of innovation:

It is worth highlighting here that a climate of innovation could be enhanced by considering the factors that affect those – individuals or groups – who will implement innovation. These factors were presented by Anderson and West (1998) as the following:

1- Vision:

| Vision | |
|-----------------|---|
| Define | Is an idea of a valued outcome which represents a higher order goal and a motivated force at work |
| Describe | <p>Having a vision will definitely facilitate the development of new ideas as this vision has:</p> <ul style="list-style-type: none"> - Clarity : degree of vision being understandable. - Shared-ness: to what extent the vision gains widespread acceptance by individuals in a team. - Attainability: it should be attainable because if the goal is not possible to achieve it will either be demotivating or so abstract that practically makes it unrealistic to achieve. <p>Visionary nature: the extent to which the vision has a valued outcome to the individual or the team which in turn motivates them to be committed to it.</p> |

Table 5.3: Four factors affecting climate of innovation (Adopted from Anderson and West 1998, p. 240).

2- Participative Safety

| Participative Safety | |
|----------------------|--|
| Define | A construct that is best understood by the idea that involvement in the decision-making process is driven by and enforced by being an environment characterized by being non-threatening. |
| Describe | <p>It was found that the more individuals to participate in the decision-making, the more ideas they develop and hence the more their decision gets approved and implemented.</p> <p>The needed inputs are influence, sharing information and active involvement in group interactions where the atmosphere is not threatening and judgmental.</p> |

Table 5.4: Four factors affecting climate of innovation (Adopted from Anderson and West 1998, p.240).

3- Task Orientation

| Task Orientation | |
|------------------|---|
| Define | A shared concern with excellence of quality of task performance in relation to shared vision or outcomes, characterized by evaluations, modifications, control systems and critical appraisals. |
| Describe | <p>Describes the commitment in general to excellence in performing the task in a climate that supports the adopted improvements to existing methods, policies and procedures.</p> <p>It is characterized by:</p> <ul style="list-style-type: none"> - Individual and team accountability. - Control systems for evaluating and modifying performance. - Team performance and work methods reflection. - Intra-team advice. - Feedback and cooperation. - Mutual monitoring. - Appraisal of performance and ideas. - Clear outcome criteria. - Exploration of opposing opinions. - Constructive controversy. |

Table 5.5: Four factors affecting climate of innovation (Adopted from Anderson and West 1998, p.240).

4- Support for innovation:

| Support for innovation | |
|------------------------|---|
| Define | Support for new ideas and way of thinking out of the box, through both articulated and enacted support. |
| Describe | <ul style="list-style-type: none"> - Articulated: written in policies and documents or conveyed by word of mouth. - Enacted: provided to the innovative individual or group directly in actions in response to innovative behavior. |

Table 5.6: factors affecting climate of innovation (Adopted from Anderson and West 1998, p.240).

Following is the framework that encapsulates the concepts discussed in all chapters leading to the research methodology.

5.8 Summary

All that has been discussed can be summarized in the following figure. It is clear that women's abilities mask the opportunities mentioned in figure 2.1, leading to a link between these two, as will be seen in the conceptual framework section.



figure 5.1: Women in the construction sector (Summary).

Chapter 6

Conceptual Framework

Conceptual Framework

The following model encapsulates the five figures – 2.7, 3.7, 4.7, 5.7, and 5.8 – which summarize the last five chapters respectively. The final conceptual framework shaped from them will be used to analyze and judge the case studies.

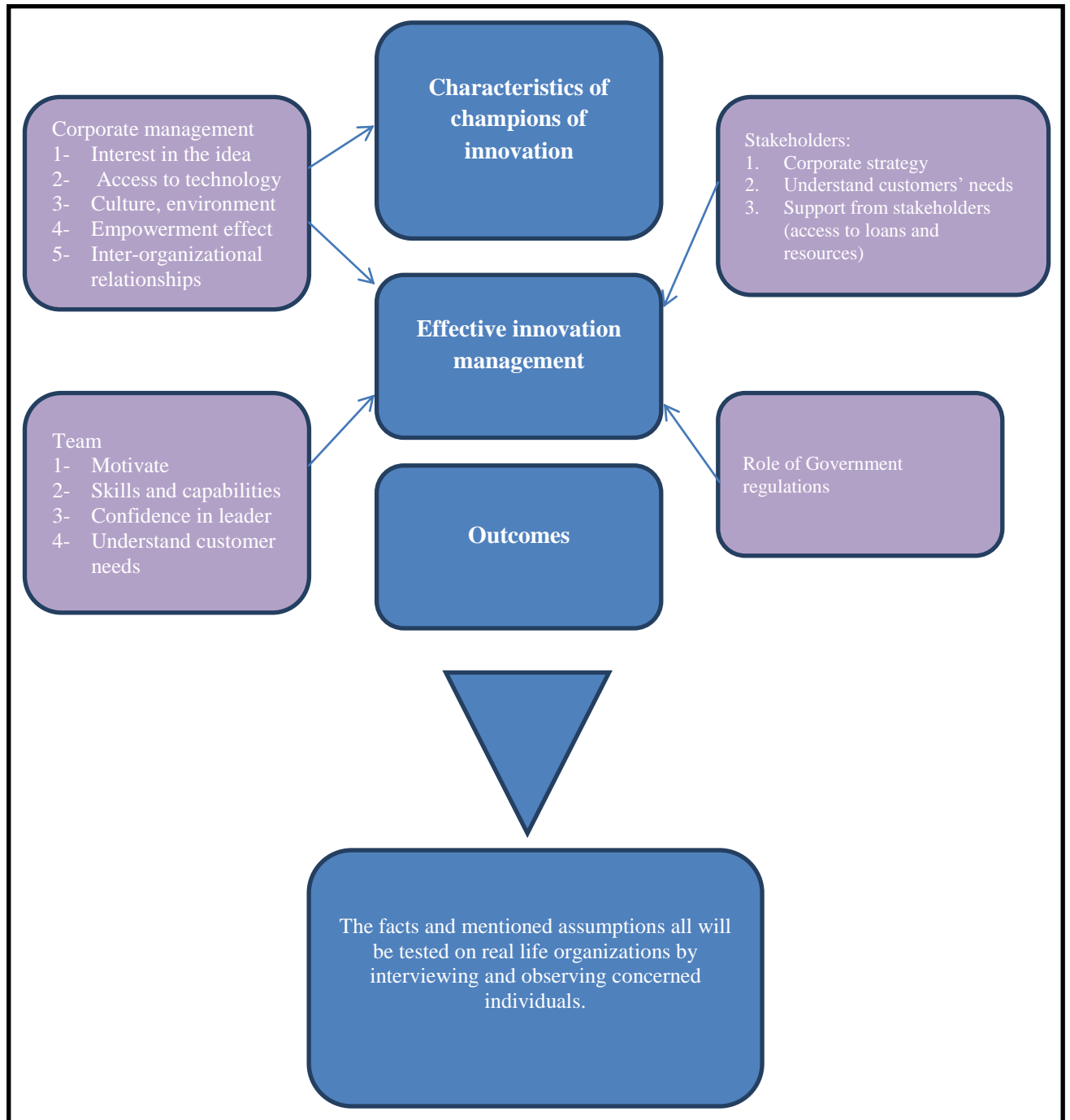


Figure 6.0: Conceptual Framework.

This section formulates a framework that will help in analyzing the case studies. It is built based on the interrelation of the literature reviewed in the previous chapters. As the aim of this paper is to examine the contribution women can make in the construction sector in the UAE to enhance the level of innovation, research found that the keys to successful innovation are the champions of innovation, since they have the capabilities and characteristics required for such a position, as shown in figure 5.7. Some of these characteristics are mentioned below:

- To be a transformational leader (Share knowledge, flexible, dynamic, empower).
- To combine the creativity of all team members to implement new ideas.
- To involve the stakeholders and earn their support.
- To understand the dynamics of the innovation process.
- To have experience and a wide network.
- To facilitate progress and convey confidence and enthusiasm about innovation.

Research on women in management showed that they could bring such capabilities and characteristics that enable them to be champions of innovation in an organization, in addition to resolving difficult issues usually faced by those champions, such as communication. Figure 2.1 shows some capabilities that qualify women to be champions of innovation in the construction sector – Figure 5.1 shows what is needed in comparison with what can be added by women. As the mentioned required characteristics are for champions in general, the following are proved to be possessed by women:

- To be a transformational leader.
- To be emotionally intelligent.
- To define the job as assessing co-workers to achieve set goals.
- To create a climate of innovation, inspire and communicate effectively.
- To share knowledge and power, and put emphasis on co-operative team work.
- To understand customer needs.
- To possess organized, multi tasking abilities, be quality focused and risk aware.

Nonetheless, they have to face many challenges in the workplace and daily lives caused by public acceptance and a strong culture.

- Work/family balance.
- Lack of role models.
- Continuous need to prove oneself.
- Colleagues' attitudes at work.
- Recruitment (pay, authority, opportunities).
- Religious and social expectations.

These challenges are affected by organizational rules and governmental regulations and support.

It was also proven that having such qualities presented by women will affect the organization in a positive way.

- Enhanced productivity, efficiency, performance, safety records, loyalty, commitment, knowledge sharing and gaining, decision making and job satisfaction.
- Decrease in employee's turnover and absence.

This leads to the formation of some hypotheses that will make analysing the case studies simple. From the figure 6.0, the cases will test the following hypotheses:

Hypothesis 1: Women have qualities and skills that allow them to manage innovation effectively.

Hypothesis 2: Women champions manage innovation effectively and increase productivity when they have a co-operative, skilled team, with organizational support and stakeholders' encouragement and involvement.

It is safe to say that the framework investigates how females are influencing such hypotheses, which will be concluded from the questions asked.

Chapter 7

Research Methodology

This research, as mentioned in the introductory chapter, is aimed at examining the contributions women can make in the construction sector by enhancing the level of innovation in order to encourage a step change in the culture of the Gulf region and the Middle East in general. It was also mentioned that this aim is to be achieved through the four objectives:

- 1- Examining the process of innovation focusing on the challenges facing management in realizing successful innovation.
- 2- Studying opportunities and challenges of women in management linking this to the management of innovation.
- 3- Investigating the challenges facing women professionals in construction.
- 4- Identifying the contribution women can make to enhance levels of innovation.

For this reason, the research question is: how can women enhance the level of innovation in the construction sector in the UAE? In this chapter it is seen that case studies are the best fit for achieving such objectives. Research on intangible concepts like innovation, knowledge, cultural aspects and women's contribution are difficult to quantify (Dikmen et al. 2005). Taking into consideration that all the aspects of innovation processes are deeply implanted in organizational cultures and that women are a vital aspect in shaping this culture, cases will be studied in this research instead of quantitatively studying questionnaires. Interviews are conducted at each company in addition to the observations that will help in describing the situation that will consequently shape each case study. Case studies are used when the research is answering why and how questions (Dikmen et al., 2005).

According to the writing guide published online by Colorado State University (2011):

“Case studies typically examine the interplay of all variables in order to provide as complete an understanding of an event or situation as possible.”

This is done with an in-depth description of the entity evaluated, the characteristics of the people involved, the nature of the community within which it is located, and the circumstances under which it happens. It also involves inferring the

meaning of descriptive data as values, motives, attitudes, and cultural norms. Case studies are preferable when the research is concerned with an up-to-date problem that pursues a holistic understanding of its aspects using logic and reason.

Since this paper is principally concerned with innovation, the targeted samples were chosen based on being innovative, whether by winning awards or their well-known reputation. When it comes to selecting the person to study, as previously stated, the number of Emirati women in the private sector – especially in construction – is low, making it difficult to find any. As a result, the women targeted will not be chosen based on nationality. Instead they will be chosen based on their position as a project manager, and on the approval of the contacted organization on whom to interview. Another point to highlight in this research is that the number of women in the construction sector working in contracting companies in the UAE is much lower and may cease to exist in comparison to environmental, design, and consultancy companies. Women tend to be recruited more into roles that do not involve working with labourers directly, or even visiting the sites. They are regularly given roles that tend to require managerial skills, which women probably have because they progress more in academic terms than their male peers.

Based upon the aforementioned guidelines, cases from Dubai are presented here showing women who lead and champion innovations, along with the challenges they faced, and the methods they used to overcome them and excel. Cases may also include women who have transformed themselves into role models, encouraging others to follow in their footsteps in the neighboring Arab world, challenging the cultural, social, and any other barriers.

The cases will be analyzed as per the model presented earlier at the end of chapter 5, concluding the best practices distinguishing women's contribution in enhancing innovation in the construction sector. The model was built based on the intensive literature review chapters that shed light – in detail – on innovation, construction and women in management, forming a rigid background.

The data collected will be the answers to questions via interviews formed from the conceptual framework. Questions will evolve around experience, innovation

definition in construction, female capabilities and how they can use these capabilities to enhance the level of innovation. Firstly, the concepts will be explained to the interviewee and then the questions attached in the appendix will be asked. The interviewee will be asked to put one project in mind while answering the questions. The answers will be transcribed and recorded – if permitted. In addition to the answers, the organization will be described using their website, observations, and the answers garnered during the interviews. The questions are:

1. Champions of Innovation:

- What are your qualifications?
- Why did you choose this path (areas of study, employers, etc.)?
- What challenges did you face (if any) as a manager/engineer, in the sense of what day to day work, promotion, when proposing a new idea, being part of a team, trusted with a major responsibility, etc.?
- How did you overcome them (immigrant, government regulations, etc.)?
- Would you say you are an effective leader within your current project? Explain using examples (leadership style, conflict management, communication, emotional intelligence, etc.).
- In your current project do you see new ideas being introduced? Give an example of such an idea? What is your role in making sure this new idea is successfully implemented?

2. Organization :

- Do you think you are an innovative organization? Why? What does senior management do to help you and your team to be more innovative on your current project (culture, work environment and strategy)?
- Do you receive support and rewards/acknowledgement/resources for your innovative work?
- Is innovation implanted in your strategy? Is it fundamentally part of your job?
- What role do you play in enabling the organization to be more innovative?

3. Stakeholders:

- How do you ensure the effective involvement of the stakeholders in your current project?
- What difference for you does it make when you have stakeholders involved/support for introducing and implementing a new idea (resources, access to loans, etc.)

4. Team:

- Can you describe the team you are working with (fresh graduates, skills, abilities, nature of the relationship they enjoy, the support they give you, etc.)? Give examples.

5. Outcome:

- What was the outcome of the innovation (did it involve champion, team, and organizational support, and stakeholders' involvement, etc.)?
- Would the expected outcome please the project team, senior management, and the stakeholders? Why do you think so? What has been enhanced?

In the five cases of this study, interviews were done with one woman only. Observations at each organization were done for two days. During those two days conversations with many employees were made in order to gather the data related to describing the organization environment and the relationship among the employees and between the employees and the management in order to gain a better understanding of the case and to avoid being biased by only listening to one point of view.

The data collected were information about the individual female, organization itself by observations and informal conversations, the team that the female is working with, and finally the stakeholders of the project(s) they are handling.

The next chapter will present the cases with their analyses. The analysis is based on the conceptual framework and the formerly mentioned hypothesis. It would be prudent to highlight here that the names of companies and individuals are not mentioned, in an attempt to preserve their anonymity.

Chapter 8

Case studies

8.1 Case I: COM I

The company

COM I is a well-known global firm with 37 offices and around 10,000 employees around the world with projects in more than 90 countries. In the UAE, they have 60 people in the office, including engineers—structural mechanical and electrical—public health officials, and consultants. Twenty-seven percent of those employees in the Gulf branches, and 37% in the head office in the UK are women. Their business is summarized below.

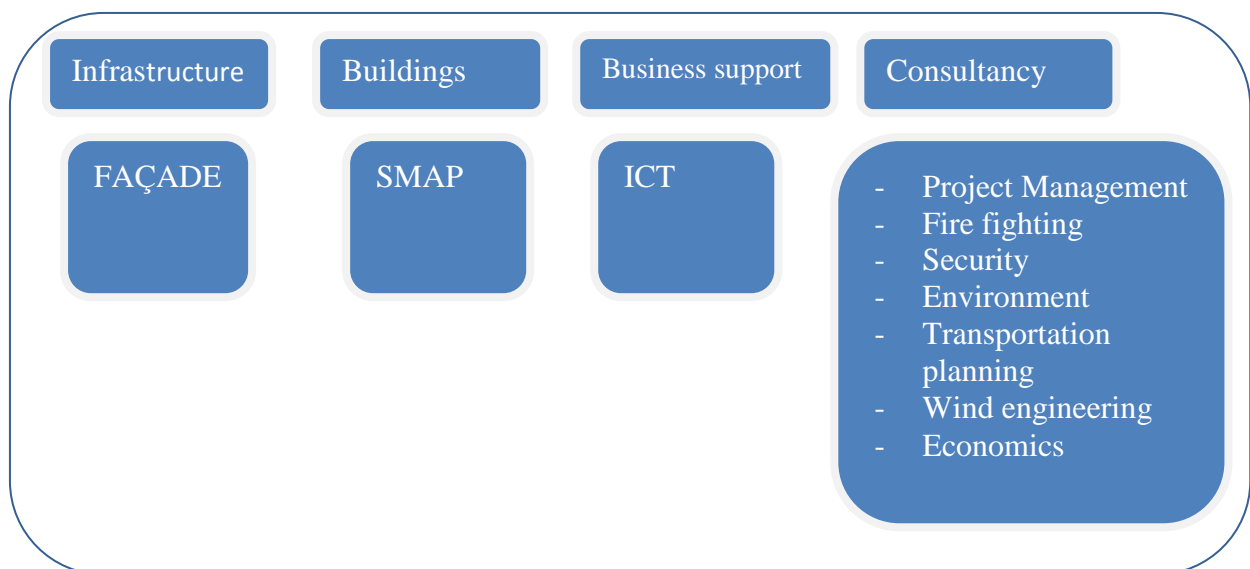


Figure 8.1: COM I's Business

COM I was founded and is owned by an architecture. It was then gifted to the employees who became shareholders. This sense of ownership assured freedom to the employees which differentiates them from competitors and in turn is thought to be the main reason for more women employees (27%) as well as the fact that COM I—according to the employees—defines projects differently than others as can be seen in figure 8.2.

The company claims that in a comparison between itself and competitors, COM I places major importance on the individual person, which results in the employee having more freedom than employees of other companies and in being more innovative. In addition, the systems and software used at COM I are always

updated to the latest technologies. The company’s board of directors sets a specific target for profits every year; however, this profit target is not set too high in terms of money. A certain percentage of the project budget is devoted to innovation, which gives the employees some money to play with, as innovation is one of COM I’s values.

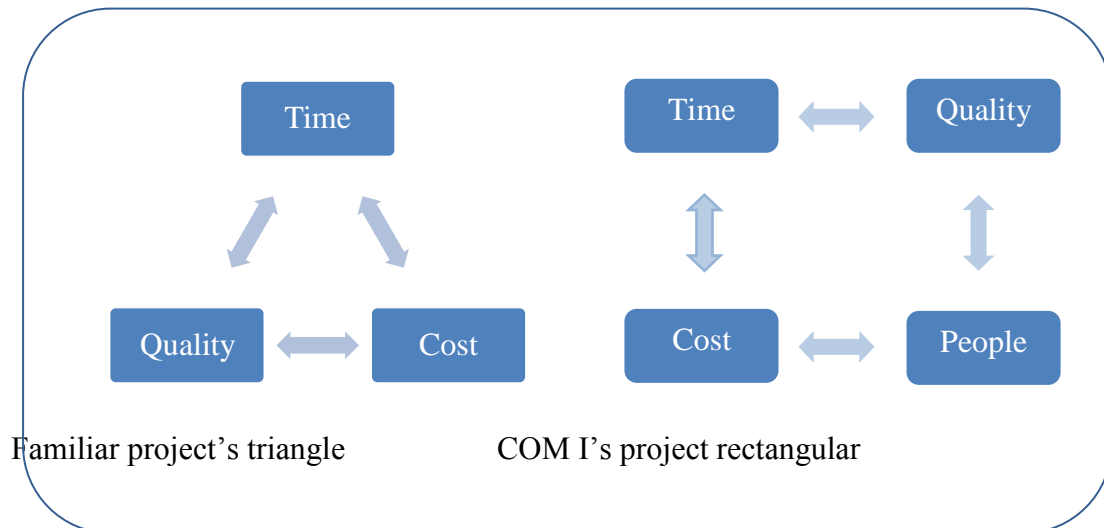


Figure 8.2: Comparison shows the difference between COM I and other companies in defining projects.

Therefore, if you want to create something, stay late, or try something new as an employee, you do not have to ask for permission, according to the project manager interviewed, and this is the reason why the turnover of employees at COM I is as low as shown in the table below.

| Year | Staff Turn over |
|--|-----------------|
| 2011 | 16.5 % |
| 2010 | 9.4% |
| Average length of service 6.1 years | |

Table 8.1: Shows staff turnover for the last two years as registered in COM I’s files.

Although engineers at COM I do not earn more than those at other companies, they stay at COM I for six years on average because of the innovation opportunity and work environment. According to a project manager there, innovation may occur at any business of theirs at any time.

Interview and observations:

As this case was studied at the PM level, the female interviewed is a project manager (Ex. (1)) who has civil engineering and construction management degrees.

As a project manager for two years in COM I, she has managed four commercial projects in which she had to bring in money, encourage good team work, and ensure people are happy at work.

Examples of the challenges Ex.(1) faced in her work life starts with when she came across a situation where she was the only woman invited to a meeting. She viewed it as an advantage, simply because she would be remembered by all for being the only woman. She also came across bad attitudes from male workers at sites, hearing phrases like, “what are you doing here?” and “you do not belong here.” As for the balance between home and work, she stated that the company is flexible with working hours and the balance does not present a problem for her because she chose the company well. With other companies, however, you may be questioned if you show up a half hour late after working late the night before, so it depends on the culture. Another aspect that may help working women is having a housemaid, which can make a difference in the balance between home and work if you can afford it.

The four projects have improved in terms of profit, resources, and systems. To illustrate this, in her four projects, she worked hard to have a proper resource plan in place that would help in re-estimating the project resources and controlling cost. The system refers to how cost is controlled and how payments are chased. In terms of profit, the projects were losing 70% before her management; however, after her management, this loss was decreased to 0%.

When it came to describing her qualities as a first leader in conflict management, she said that “it is difficult we as women are emotional while men are assertive”. As a woman, when you think of the other person’s feelings, solving conflicts becomes challenging for some women, but not all. Second, in her leadership style, she doesn’t like to order because they have a very friendly environment where they all respect each other and have trust. Thus when there is a lot of work, the team members will stay late, not because she ordered them to, but because they want her to succeed. Trust is the kind of relationship she has with the team. It is worth mentioning

that she is not very direct, like a man, but this is not a disadvantage, “people stay for the love of the company and love of each other”. When hiring a new member to her team, she looks for the willingness to work hard, willingness to learn, and character. Every year, at COM I, they hire new graduates because in seven years, there will be no one in certain grades (i.e. grade six which is for senior engineers). They will have no one in ten years if no one was recruited as an engineer this year. Last year they had 27% females as new graduates. Thirdly, emotional intelligence is believed to be essential by her as sensing another’s feelings helps in understanding what tasks to give and what outcome to expect. Men do not always have this intelligence because they are less emotional by nature.

Due to that fact that in COM I there are many departments and specialties, their definition of innovation differ from one person to another as they believe it depends on the perspective of each person (position). The project manager who was interviewed defined it as finding a way to approach a problem using fewer resources, less time or a new idea. It is worth mentioning that she has her own principle for innovation, which is “keep it simple and easy.”

An example of her innovative contributions is a commercial management system that was supposed to be working effectively in a construction project. The system was not functioning properly, and the project was losing money. She studied the project and implemented a system that was so simple that anyone could use it, and it worked well. Surprisingly, the support and resources needed for such innovation were not given to her because she proposed changing a system that was comfortable for the people involved. They tended to resist the change and did not share any information. As a result, she had to work alone to introduce the new commercial system.

Innovation in engineering projects is easier than in consultancy for COM I, as innovation is the main difference between COM I and other companies. As highlighted by Ex. (1), every year they include a budget for COM I research and innovation. For example, they send their employees to study subjects that are new and/or very specialized, such as certain materials or a particular design that could take up to four years. They invest in people to invest in the sector, and now they have their own university in the UK.

Regarding the differences between men and women, her experience leads her to believe that women are naturally more hardworking and more ambitious, especially in construction, because of the continuous struggle between the two genders. Nonetheless, she is satisfied and likes the construction sector, saying, “it is a good thing.”

Women are different only in nature, such as in solving conflicts where “men start swearing at each other’s but when there is a woman they do not swear and they respect each other more”. Women can multi-task more than men, and they are hard working. To prove this, from observing her at work, it was noted that in spite of the fact that she is pregnant, she goes around, checks her projects and asks for information. Also, she is travelling to Doha every two weeks to check on their projects there. However she disagrees with the positive discrimination against woman “I don’t want to be chosen for a position just because am a woman”. Her success in reaching higher grades at COM I, and her excellent work according to Ex. (1), is the reason of dedication, hardworking, secured job, understanding the contractor and sub consultants. All of this is done by not being a female. Don’t forget that the most important issue to her is to understand the contract very well. After all it is her job to check the compliance of the designs and all aspects in the actual implementation according to the signed contract.

COM I knows that women can make a big difference, and that is why they encourage recruiting women. That is also why they have an initiative in their company to promote diversity -starting with gender- called “connect women,” which is a way to makes sure that women stay at the workplace even after maternity. They are there to not only to share knowledge and ideas, but also maintain diversity in the workplace. An example is the maternity leave that in UK extends up to six month without any financial loss, and they are encouraged to come back to work by offering training and initiatives like “connect women”.

As for the clients’ needs, COM I does not usually listen to the customers’ wishes. They suggest better ideas, which is not always right, but it is known that COM I is not approached unless it is with an innovative, sustainable, unique construction project or façade. Finally, the outcome of any innovation is personal satisfaction, and the result may be to save money for the customer. In fact, innovation

is not necessarily expensive. Most of the time, it is less expensive to innovate than to execute projects in the usual way. At COM I, innovation occurs because it is a value of the company and because of the formerly mentioned reasons. However, employees do not get incentives and are not paid more to innovate. Although it takes time, it is a company value, and it is what they do.

8.1.1 Analysis of Case I:

As was formerly mentioned in the conceptual framework section, the cases are analyzed using the developed framework (Figure 6.0).

1. Characteristics of the champion of innovation:

Ex (1) is a female project manager that is a transformational leader, is emotionally intelligent, shares knowledge and power, understands what customers need, is organized, always multitasks, ensures innovation in everything she does, and inspires others to excel with her attitude and performance. These are all qualities of a female champion of innovation, as discussed previously. It is also worth highlighting that her strong character and confidence help her overcome challenges such as poor worker attitudes and underestimation due to being a woman.

The idea presented by Ex (1) for the new commercial system was not supported at first by corporate because it presented an entirely new approach to doing things that threatened what they are accustomed to.

However, the technology she had and the environment that gave her flexible hours of working, along with the authority she possessed as a project manager, made her succeed on her own and convince them that her new system was easier and simpler to operate. In this project, no one from the stakeholders shared knowledge or information with her about it, but other colleagues in different departments working on other projects were happy to help her, given that they had an open and friendly environment.

Hence it can be stated that the corporate management influenced Ex. (1) as a champion of innovation by empowering her to follow her innovative idea to the end

and prove it is beneficial to the management; however, no actual support such as certain resources was given. In fact, she had to work alone.

2. Effective innovation management:

The process of innovation was already discussed earlier. Ex. (1) faced the challenge of the need to assess each idea to check whether it is beneficial or not and then have it presented to the management team for consideration and approval, followed by implementation. Ex. (1) understood this process, but she faced the challenge of opposition. Her belief that her idea was beneficial made her carry on with it alone to prove its value. To be effective, management has to consider the following factors:

- Team: She had to work alone, as she did not have one for this project, although she had a team for other projects composed of qualified and motivated members who trusted her as their leader.
- Stakeholders: She did not have the approval or support from them.
- Corporate management: She used all available resources and her authority to complete her system in spite of lack of support from the management.

It needs to be said here that Dubai government has no regulations regarding having a certain percentage of women in the construction sector companies. Nonetheless, COM I's initiative for encouraging women to enter this sector implies its belief that women can make a difference in the workplace. This is proven by low turnover and can be seen from the performance of Ex (1)—she is an example of enhanced productivity, loyalty, commitment, knowledge sharing, and efficiency.

3. Outcome:

The outcome of this Ex (1)'s innovative contribution is the internal satisfaction that she could perform as a woman in a masculine sector. The other outcome is the money that was saved because of her way of management. Innovation is one of the company's values; therefore, the major outcome for the company is that through her performance and project leading, she assured, obtained, and maintained that value.

Hypotheses 1 is satisfied from this case, yet hypothesis 2 was not satisfied as stakeholders and skilled team members in addition to the organizational support were not involved in this innovation as she had to work on her own and depend on her skills and loyalty.

8.2 Case 2: COM II

The Company

COM II is a large organization known for its developments in Dubai. According to the company's website, those developments "have become true icons across the world." In other words, COM II is "developing an iconic portfolio of innovative landmark projects in Dubai" in different sectors, including commercial, residential, leisure, and retail. Most of the company's projects are "reference points for creativity, ingenuity and daring."

The company's vision is to inspire humanity through its employees, its customers, and the environment. Hence, they introduced a new initiative, the "Blue community," in which they claim to be the only organization in the Arabian Gulf area with a dedicated budget for experts to work full time in environmental research and development in order to build a universal set of standards for coastal developments.

COM II is considered to be one of the largest real estate developers in the world, and therefore the organization is involved in Dubai's vision for the 21st century in terms of executing projects for living, business, and tourism.

Interview and observations:

At this organization, the female interviewee is a young Emirati lady (E.L) who studied architecture engineering and construction management, followed by a course called the Dubai Leader Program (DLP). She chose to follow this path "just to be different and show that women can do this, I worked in all architect, electrical and civil." When she began studying, she would hear phrases like "I can't imagine you did this discipline in college." However, her family was very supportive and trusted in her capabilities.

She was first recruited to COM II because she had previous training in the sites during her college study. At COM II, she worked in several positions during her eight years of employment, including:

- Project engineer: This job included site inspection of projects located at sea. Hence, the inspection included not only going by boat to the work site but also diving. Although she did go to the work site by boat, she did not dive because she felt that there were other employees being paid to dive. Also, she believed that if she were to do it once, she would be expected to do it again.

Lease engineer (Authority coordinator): She worked in this position for one year.

- She was chosen for this position because of the relationships she developed through her network of investors, government officials and end users. This also gave her the opportunity to meet and connect with other people. She was also responsible for taking photographs of the work in progress and sending them to the appropriate project managers to use in their daily reports.
- Utility engineer: She performed her work quickly and efficiently; no mistakes were found, and the submission of required papers to her manager was better than expected. This position was challenging because the manager found it difficult to admit that she worked harder than other engineers, which made him reluctant to promote her.
- Design review: During this four-month project in the office, she had to check the drawings of the consultant and contractor. She developed a simple checklist that made her job easy and fast. However, this job became too routine for her, and she filed a request to move into another position with management. The checklist she created is still used by others in COM II.
- Development manager: This position included creating financial assessments for projects, feasibility studies, contracts, lease agreements and descriptions of the scope of the work involved in the projects. Hence, everything she learned while working in previous positions was also useful in this one. According to her, she learned everything from the site:

“It is more exciting there. When making a feasibility study, you need to know all aspects and components of the project. For example, there

might be one generator missing that you will not discover unless you know what it is and why it is needed.”

Nevertheless, she was bored again after two years and decided to change positions.

- Investment department: In this position, she helped manage COM II's properties by meeting with investors and contractors to resolve any issues. Her main challenge occurred when she had to use a policy of give and take to reach an agreement with a contractor to remain on the job during a crisis. She promised the contractor a reduced payment to finish a certain percentage of the work, and when it was completed, she kept this promise.

While working for COM II, her main goal was to challenge herself by performing her job duties better than other employees, which presented a threat to them because she exposed their weaknesses. For example, one employee took two days to prepare a report; she completed it in only four hours and submitted it with no mistakes. When she presented an idea, she credited it to the whole department as a team so that recognition would be given to the entire department. A hidden reason for her actions might be that if she was known for coming up with the innovative idea, the next time a senior member of management might contact her directly rather than going through her manager or department head, which would threaten these supervisors.

In response to these challenges, E.L. chose to remain silent and to continue challenging herself by developing innovative ideas whether or not she received recognition. According to her perspective, being unmarried makes her job easier because she has no obligations to anyone else. She does not have to stay home to take care of a husband or children; hence, she advises all married women to manage their time by getting an immigrant maid if they can afford to and can find a trustworthy individual, by working in governmental offices, or by working part time in private companies.

Because she frequently changed positions, she worked with several teams with diversity in terms of age (40+ years), experience (20+ years), occupation (electrical, mechanical, structural, etc.), and background. Her leadership style is chosen based on the attitudes she is dealing with. For example, she would give orders with time limits to a team that uses phrases like “you are young” and “what are you doing here?”

However, some of the team members are careless because of the fact that a female was ordering them. Hence, she tells them assertively what needs to be done and defines the time limit, giving no excuses. On the other hand, as a team leader, she supports the team members in front of the Human Resources department when needed; therefore, they trust her even though they do not always do what she says. At the end of the day, the team is willing to help to finish the project. This defines the relationship with her team. Although sometimes she has to be assertive, in other times she has to be intelligent emotionally to solve problems among workers and colleagues. In other words, she is a harsh and nice leader, depending on the situation.

On the E.L. (1) level, innovation is planted in every aspect of her job. She tries to enhance her work environment and her job performance by innovating despite the fact that no one around her is innovating. For example, she must manage her time and prioritize activities in a way that her performance and execution of work goes faster and saves time. As a project manager, she is authorized to enforce her innovative ideas in the sense that a contractor has to implement them.

For her, the most important factor is the fact that she managed the contractors during the crisis, as well as completing all of the projects she supervised on time despite the limitation of a lack of liquidity that meant having to ask the contractors for discounts and to keep working in uncertain circumstances. This reflects well on her ability to solve conflicts between contractors and clients in an influential way.

At an organizational level, COM II is an organization that sees diversity as a reason for innovation. Being exposed to different backgrounds, cultures and experiences in a friendly environment will motivate a person to be confident and enhance his or her performance, creating a climate of trust and knowledge sharing. COM II gives rewards for innovation only in terms of a bonus; it is not implanted in the organizational strategy and there is no requirement to innovate. Innovation is welcomed as long as it saves money, saves time, or gives the organization a competitive advantage in the long run. Hence, to be a champion of innovation at COM II, the drive must come from a team, not an individual, in order to gain the support and budget needed.

At COM II, it is the developers who propose the projects and execute them, then sell them to investors. They have to make sure that all the stakeholders are effectively

involved in each project. This is the job of the development manager and the investment department. The manager (E.L (1)) sets up a workshop inviting all the stakeholders where she consults with them about the proposed project. At the same meeting, the consultant will present all the sketches drawn by the designers and make sure the stakeholders sign up if they agree to them. This is to guarantee fewer issues in the future. However, there is an opportunity for the consultant and contractor to present ideas that will enhance the project's performance and only then is the idea's budget set.

Having said all that, the best reward that comes from innovation at COM II is the recognition from people. Recognition will encourage others to be like you and innovate, which may eventually lead to a promotion or bonus.

8.2.1 Analysis of Case II:

1. Characteristics of the champion of innovation:

E.L (1) is a strong, confident, and determined woman. She started working at the site and became a member of top management and deals with investors. She can be a traditional or a transformational leader depending on the situation and required attitude. She is emotionally intelligent, and she understands what stakeholders need from the workshops conducted before any project is implemented. She shares knowledge and sometimes empowers her team to innovate. The fact that every job she has handled has been completed more quickly and accurately than those completed by others shows that she is organized. She defines her innovative contributions as a product of teamwork.

The challenge she is facing is that she feels invisible, and her ideas are being credited to the whole department instead of to her. E.L (1) found that the best way to face such challenges was to keep silent and work hard to set an example, which will eventually make her visible. Her contribution is finalizing the projects during the financial crisis in a timely manner and within the given limited liquidity. Her way of solving conflicts between the company and the contractors, the connections she had to facilitate progress, were the key to her success in implementing her strategy of execution.

Corporate management was supportive of her ideas for managing the projects in such hard times.

COM II provided a supportive environment that empowered her to achieve many things by giving her monetary resources and allowing her to develop friendly, diverse relationships that provided the necessary information through the sharing of knowledge. Technology was not a key factor in this case because money, skills, connections and the implementation process were needed.

2. Effective Innovation Management

E.L. (1) understood the process of innovation and how it worked in her company. The entire department took credit for an idea, and they functioned as a team to manage the resulting project through its completion. However, this did not prevent her from proposing new ideas or disappoint her; in contrast, it made her more determined to prove the idea was beneficial and to develop additional ideas silently. Her new strategy in dealing with contractors during a time of crisis through give and take was beneficial because of the following factors:

- The team was supportive, skilled, and had confidence in her as a leader.
- The corporate stakeholders provided everything necessary to finalize projects in accordance with contracts based on clients' needs. They also provided necessary loans for her to complete projects on time.
- External factors such as government regulations during a time of crisis had no effect on her work.

Having E.L. (1) with her experience and connections in the company - at that time- has enhanced productivity, the performance of projects, and decision making. Other employees were also encouraged to view her as a role model.

3. Outcome

According to E.L. (1), the most positive outcome of this new strategy of give and take during a time of crisis is the recognition that encourages others to follow in her steps

and think outside of the box. Thus, hypotheses 1, 2, 3, 4, and 5 are all proven true in this case.

8.3 Case 3: COM III

The Company

COM III is a governmental authority in which construction projects that reflect social responsibilities are executed. The department studied here is the administration department, which includes engineers, project planners, and those responsible for contracts and procurement. This department is responsible for investing the incoming money/budget in projects that not only bring in profit but that also provide value to the community. The communication of this department with other departments of the same authority is formal, meaning communication is only conducted through meetings due to the fact that this department works with external parties, such as consultants, stakeholders, and contractors. The department work environment is friendly but competitive, where an employee is motivated to innovate through competition. As this authority participates in national exhibitions, employees are exposed to different sectors and governmental authorities; therefore, competition motivates them to be innovative. On the other hand, timing is not flexible, as they have a punching system in which those who are late receive deductions in spite of their innovations or the reasons for their tardiness.

The administration department's mission (from its website) is to protect society and its economic development through facilitation and compliance. They are committed to the following:

- Providing quality assurance and adopting the best national and international standards
- Using customer feedback and the best available information systems to enhance their performance and ensure efficient operations
- Managing knowledge gathering, sharing, use, and development
- Undertaking research in their areas of expertise to evolve with the new practices
- Ensuring their policies, legislation, and procedures are maintained

From those points, it can be concluded that innovation in this department is needed in order to excel and enhance community life in terms of the executed project's nature.

Interview and observations:

E.L. (2) is an architect engineer working at the mentioned department; she is a designer and supervisor. She applied to be president of the society of engineers and for the Emirates prize for ladies and more. She had no time to focus on those responsibilities so did not win. According to her, training, exhibitions and support are the main issues that need to be regularly set for engineers to enhance their performance as well flexible hours that can be offered by an understanding manager who allows a mother to be late or leave early.

In COM III, she designs the shape of a project and makes sure that the design is executed by visiting each site regularly. One project of hers is a building near the Dubai ports where importers and exporters can rent an office and do all the paperwork related to their shipments. The profit from the rent and paperwork fees go back to COM III while the community represented by the importers and exporters benefit from a place that is close to their work areas saving them the time and trouble of traveling between locations. However, the project discussed here is the fishing ports that will be explained later.

When asked about choosing this path, her answer was to formalize the other major she really wanted to study, which was art. Having art and engineering, she formalized her title as an architect engineer. At first, E.L. (2) faced social and family opposition; however, the impact of studying architecture engineering is less than civil engineering because an architect does most to all of his or her work in an office instead of working with the laborers at the site.

Her relatives made comments such as “As a local you are wearing an abaya, how will you go to the site?” and “Do you really think you can?” According to her, the number of women studying engineering is increasing every year. After graduation, she applied for an engineering job in a governmental department; she was disappointed when the interviewer made the following comment:

“Because you are a girl, I will not take you. You have alerted me that we do not have enough engineers, but I cannot take you.”

According to E.L. (2), her main challenge is the daily need to prove herself in every activity.

Her current project is fishing ports. COM III is constructing facilities for fishermen who have suffered for years because they have no place to stay or to store their fishing equipment. This project has three main objectives. First, the facilities will provide a place where fishermen can fish, live, and interact with each other. Second, the stakeholders will be represented by a port management team, which did not exist before this project. Third, these facilities will provide supermarkets, signature restaurants, and other types of stores for consumers. Revenues from these retail stores will cover the expenses of the project. In addition, these ports will become tourist destinations.

The main challenge was the first meeting with the end users. She had to convince these fishermen, who are mostly uneducated, older people, to accept the fact that their old buildings will be demolished and replaced with better structures. Based on their facial expressions, she believed they were thinking things such as “Why are you sending us a woman?” and “How do you take inquiries from us in such a way?”

The problem was that, even though they know this project was for them, they found it hard to accept a new change. After her meeting with them, COM III decided to find a man who was of a close age to the fishermen and who was familiar with their traditions and way of life so that he could speak on their terms. This resulted in easily earning their approval, and the project now is 70 percent complete. Her family presents further challenges, as she is a mother of three kids. Her work in a government department allows her to find a balance between working and caring for her family; however, her nanny and housemaid said,

“You should have them if you want to continue in this career, especially if you leave the worksite at 6:00 or 7:00 PM.”

It is worth mentioning that she leaves home late every morning just to see her kids and communicate with them, although she is not the one to prepare their breakfast or drive them to school. From this point of view, it is trust and time

management that will help her achieve the work-life balance. It is worth highlighting that COM III has a nursery so female employees can take in their kids and work without worrying about them being at home, and this enhances their productivity.

As for facing the formerly mentioned daily challenges, she chose to convince others of her capabilities by being prepared for any meeting and displaying a respectable attitude and behavior.

As for the official attitude toward women, no discrimination is apparent in the COM III workplace. The two genders are treated equally. The only criterion for promotions and bonuses is the quarterly evaluation.

The team she is working with consists of civil engineers who each have more than 10 years of experience. They communicate every day, but they have a formal weekly meeting and a monthly meeting. The weekly meeting depends on their available time, but the monthly meeting must take place. Their relationships are based on knowledge sharing and motivation to finish the projects in less time with fewer resources.

As a leader, she encourages her team by creating an internal motivation for each team member to help him excel and produce better, innovative work. E.L (2) leads by example. However, she is assertive when necessary. For example, she was once asked by a member of her team, “where are you coming from?” She raised her voice and assertively told him to respect the boundaries and do the job, which is a behavior that no one was expecting from her. Another time, she was in a conflict in a meeting with the sub-consultant and the consultant. As she represents the client, she stopped the meeting and again raised her voice assertively and said, “this is not a children’s’ playground. We are not children.” The result was that they calmed down. Therefore, using bad words and yelling may not be as effective as using a good choice of words that can simply solve a conflict.

In spite of these situations, she believes that men are needed at the sites when conflict rises and in managerial issues because support is needed to be heard by top management.

With regard to innovation, although there are limitations to innovation, such as management approval, budget constraints, time, and other factors, E.L (2) tries to

innovate within those limitations. In her current project of the fishing ports, she worked with the consultant on the design with a target in her mind of linking old and new Dubai in addition to the landscaping that included sculptures symbolizing Arabic and international focal points in the walking areas. These are simple ideas, but they were not approved because of the budget. At this point, it was proven by her that when the budget is not a problem, all of their innovative ideas are implemented—supposing that they are beneficial ideas and reasonable to the top management.

An innovative idea of hers that was implemented was having a wall in the department consisting of wooden squares of 60-by-60 cm each. It was expensive to have wooden squares, so E.L (2) came up with the idea of having the squares be paintings. Each square has a different drawing made and signed by a local Emirati painter. Buying those paintings was also expensive, so she used a sticker of a printed copy of the original painting and then collaborated with the society of form art to contact the artists in order to sign them. It is worth highlighting here that in their contracts with the contractor and consultants, they have a clause about value engineering that specifies that any innovation to save time and cost with the quality preserved is welcomed from any party whether themselves, a consultant, or a contractor. Innovations that do not save money are not welcomed.

It can be said that the innovations she makes in her position reside in her drawings, such as in designing green buildings and in dealing with stakeholders when solving conflicts.

The organization has received gratitude emails and certificates for being an innovative department during projects. They have a system that any employee can log on at anytime from anywhere and put any idea in the box regarding any government department. If this idea is then implemented, the employee gets recognition in terms of a simple certificate or announcement.

To identify the stakeholders for each project, COM III, as the client, hires a master planner to collaborate with while studying the project and its site conditions. For the fishing ports, the stakeholders involved were the Dubai Police, Coast Guards, fishermen society, Dubai government and the Ministry of Water and Environment. COM III had to contact all of them for a meeting or a conference. They then signed contracts that bound them. An example of the challenges faced in this project with the

fishermen was mentioned formerly. In addition to the complaints of the projects' neighbors, who did not accept the fact that fishermen will be living in a building next to them and threatening their privacy, they filed a complaint to the higher authorities that made it a political issue. However, this also was solved by higher authorities.

The outcome of the innovative project of fishing ports is the social satisfaction and the experience gained for E.L (2). However, not all parties were happy with that, as the contractor was forced to pay some penalties that the department had agreed on in the finishing works with respect to value engineering.

8.3.1 Analysis of Case III:

1. Characteristics of the champion of innovation:

E.L (2) is considered to be a champion of innovation because of the huge beneficial project she came up with. The social value of such a project is her credit.

To describe her based on the case, she is a leader who leads by example. She does not give orders, but she expresses her needs and works on her own part while guiding and encouraging her team's members. She shares knowledge and power with her team with respect to the boundaries she has set. She values others' emotions and shows concern for their personal issues, which she can predict from reading facial expressions. This helps her determine what to ask for. She understands the needs of her community, and this is proven by the project idea itself. Being organized and multitasking are necessary qualities when having to strike a balance between home and work.

E.L (2) is an example of a successful working mother who managed her time and priorities between her household and job by using the available help, such as that from immigrants, and giving up some of her salary, which is deducted for being late every morning. The other challenge is her need to prove herself continuously every day.

Management was interested in the idea because it is beneficial in terms of social value and financial return. It provided E.L (2) and her team with the required resources, empowered them, used the latest technologies and even interfered politically to solve the surrounding issues, as was mentioned in the case.

2. The effective innovation management:

E.L (2) is an architect engineer who has been leading the design and implementation of this project from the early master plan to its completion point of 70 %. Managing such a project required her to consider and deal with the following:

- Corporate management: This sector provided the technology, empowerment and support needed because of interest in the idea.
- The team: Although the skilled team did not always have confidence in her, she empowered and motivated each member to perform better and be innovative.
- Stakeholders: whose support she gained after she understood their requirements and needs.
- External factors: As she is working for the government, the regulations were no problem except for higher-level political interference that was solved on a political level by her organization.

3. Outcome:

The innovative contribution that E.L (2) made has enhanced the quality of life of the fishermen and developed the old fishing ports of Dubai, which is considered a social value. In addition to the experience she gained from being exposed to such an environment, she gained internal satisfaction and compensation for all the trouble and conflict she had to face during its initiation with the fishermen and the team.

Finally, it can be stated that hypotheses 1 is satisfied while for hypothesis 2, it is partially satisfied as the fishermen —the main stakeholders—did not accept that a woman was leading this project and refused to collaborate except for the stakeholders' support and encouragement.

8.4 Case 4: COM IV

The company

This company is a multinational consultant in the field of engineering and design. According to its website, COM IV resolves complex challenges introduced by the manmade and natural environments. Their services include, but are not limited to, the concept of a master plan, rail network upgrade, management process improvement and modeling a flood defense system. Having such a diverse range of services requires having a diverse work force. Hence, they have architectural engineers, civil engineers, and planning and consultancy professionals who work from the onset of a project taking into consideration the client's involvement and the needs of the end users.

COM IV focuses on the quality and excellence of the design to add value and flexibility, as needs usually evolve with time.

COM IV started in the Gulf area in 1967 with only design department and supervision. Its regional office was established in Dubai in 1979. Now COM IV has around 2,000 employees in the Gulf across the United Arab Emirates, Kuwait, Bahrain, Oman, and Saudi Arabia. Around 30% of the project managers are women. In explaining what COM IV does, its website says:

“ . . . offer total programme management solutions and use innovative thinking and new technologies to optimise the long-term performance of our client's assets. By taking a sustainable approach, we ensure every project we undertake will deliver long-term benefits to the communities in which they operate.”

Interview and observations:

The female interviewed is a senior project manager (Ex [2]). She has been working for COM IV for five years. Her qualifications are a master's degree in landscape architecture and a bachelor's degree in architecture. She has been working for 10 years in this sector. She chose this area of study because she loved it and because, according to her, it was not hard to convince her family that a discipline like architecture is not as civil, where a female has to go to a site and face people with bad attitudes.

After her studies, she worked for another company, where she executed projects from scratch to full submission. She was recruited because she had five years of experience. After working there for another four years, she had gained a reputation for being not only an architect but also a project manager, which was the reason COM IV contacted her to work as a project manager.

She was at a point in her life where she had to decide whether to continue working in architectural design and become an excellent designer or start a new career in project management. Because projects are divided into design and management processes, one person cannot do both. Hence, Ex (2) accepted a position as a project manager at COM IV and became a senior project manager during the last six years.

She has faced multiple personal and professional challenges over the course of her career. The main personal challenge is balancing her family obligations and work responsibilities. Because she is a married woman with two children, she must find time to raise the kids while performing her duties at work as efficiently as a single woman would. For example, when she was in her eighth month of pregnancy, she still had to go to the site to prove to her colleagues that she could work under pressure and that being a female is not a barrier. Although she may hear comments, such as “What is she doing here?” and “Go home,” she does not want to be considered as less capable than a man. In addition, she occasionally must attend a dinner or other event with her coworkers; she is the only woman among 20 men in her division (13) in the company, so this is a challenge for her. While everyone expects her performance to be excellent, they do not consider the fact that she has a baby and husband waiting for her at home.

For example, on one occasion, she had to go to the office for a three-hour meeting and then rush home to her ill child.

Hence, it is the social and family expectations. Eventually, she found the balance when she hired a maid to take care of the house and her children while she is at work. In addition to having a key factor according to Ex. (2), which is the support from her family and husband who helped her get where she is.

As a leader, she is currently working on a \$1 billion project in India. The project is mixed-use development in Delhi, India. In this project, the challenge is

entering a new market where they are following a new package delivery strategy. The change in their delivery strategy rises from the fact that they have over 30 stakeholders, and the regulations are different than in Dubai. Observations showed that she is assertive in most situations; however, she is emotional when there is a personal problem with a certain person. Although it depends on the situation, according to Ex. (2) female managers are more emotional than males. She may be behaving assertively toward a person, but inside she feels bad about it.

At the beginning of each project she makes a matrix of the tasks and the individuals responsible for them. Then she distributes it directly to them with an embedded message. In spite of being time- and effort-consuming, this matrix reduces the conflicts that may arise from people blaming each other for not doing the job properly. Hence, according to her, being a female is linked to being more organized, hardworking and capable of multitasking.

The team she is working with has no fresh graduates due to the financial crisis. They cannot afford any mistakes in project management as they have to meet the demands of the clients who COM IV needs to retain. Her team consists of a project manager, an assistant project manager and a project secretary. All of the team members have more than six years of experience.

When a conflict arises between stakeholders or team members she tries to make the parties discuss the issue and reach a solution. However, when the conflict escalates to the extent of threatening the project performance, she intervenes and draws lines as a project manager stating what each party should do, since eventually they have to deliver the project.

The next point to discuss is innovation. Innovation in COM IV is triggered by the customer's willingness to pay for being different or having sustainable building or construction. As COM IV has innovation in its values, many innovations have taken place during Ex (2)'s work life at COM IV, but the one she was involved in and championed is a challenging project where the company was asked to deliver a small sustainable building with a tight budget that none of the appointed members or leaders of the architecture had accepted, as it is impossible to meet such a deadline with this budget, according to them.

It needs to be mentioned here that the architectural team is the department responsible for appointing the team members for each project, as well as for appointing the leader. Usually, there is a senior architect supervising the team leader. Ex (2) was asked if she could do it and she agreed to taking on the challenge. She came up with the idea that they should execute and perform differently than they do in other projects.

What she did is called thinking outside of the box. She stated that “this is a very simple project, and what the company needs is to change the project delivery strategy in which the projects are usually delivered.”

She saw that what takes a high percentage of the cost is the overhead of the professional who supervises the project. Hence, she appointed a junior engineer who was nominated by her to manage this project without a supervising professional.

Instead of the professional senior architect, she supervised this junior. She took advantage of having an architecture background and attended all client meetings with the junior, and when the junior was unsure or hesitated, Ex (2) would intervene and answer. In addition, she solved any issue regarding the design to avoid the need for professional architects. Certainly, the drawings needed to be reviewed by a professional architect periodically, but this action made the project more affordable.

At first, this idea was opposed by the senior architects, who are used to a certain project order, but she had some people supporting her, including the general manager of the office. After finishing the project, she made a presentation of what was done as well as the costs saved. She was told that “this is good but cannot be done every time.” As a reward, a champion of innovation will be recognized and sometimes gain bonus.

The outcomes of the new delivery strategy are saving costs, conserving the professional’s time, and increasing employee happiness, as this is a small, controllable job. To give a numerical indication of how beneficial this innovation was, a typical drawing after submitting the project costs around 12000 Dirhams; however, in this project, the drawing was made for only 3000 Dirhams. It can be noted that this is dramatic change in the approach to project delivery at COM IV.

It is worth highlighting that as COM IV is a consultancy company, it is not the responsible party for contacting and involving the stakeholders.

In conclusion, the organization promotes innovation, but due to the fact that it has more than 16,000 employees around the world, it has grades and levels that must be considered and a strict system. She says, “if you have an idea, you should know your way around and prove yourself before the other employees will trust you.” For example, if one of her team members has an idea that is beneficial, she takes it to the upper levels. Still, COM IV has an energetic environment where all employees are professional in their work and attitudes. The outcome of innovation in her current project at New Delhi is building a comparative advantage for COM IV in India, as well as the internal satisfaction that she will gain as she knows that this is currently COM IV’s biggest project. Two other benefits are customer retention, as the clients may hire COM IV for other projects, and finally it presents a social value for the people of India.

8.4.1 Analysis of Case IV:

1- Characteristics of the champion of innovation:

COM IV is thought to be one of the companies that understand the value of having women in the workplace. As the numbers show, they have a high percentage of women at the project management level. This may be argued by the facts mentioned in the literature, such as women presenting enhanced productivity, loyalty, commitment, efficiency, and knowledge sharing. Although it shows that Ex (2) is the only female project manager, it is also mentioned that 30 % of COM IV’s managers in the Gulf area are female.

Ex (2) can be described as an experienced engineer who is now a project manager, not because of a degree, but because of her experience in the field setting an example of what women may achieve through determination.

She is an emotional leader who sometimes has to be assertive, yet cannot do so without feelings of guilt. As a leader, she inspires and empowers her team members to share knowledge and come up with ideas, thereby creating a climate of trust. She solves conflicts by first allowing the two parties to argue and attempt to solve the issue themselves. If the parties in the conflict cannot come to a resolution, she will interfere and solve the issue assertively, as mentioned in the case. She encourages her

team members to excel and innovate. In addition, she is emotionally intelligent; she stated that being emotional and hardworking, and multitasking are female qualities by nature. She attributes her success to her team. Ex (2) understands what the clients need and is able to satisfy them.

The main challenge for her, among others (such as the attitudes of men and social expectations), is finding a balance between family and work, as she is a mother, a wife, and a project manager. The key factor to facing and handling this challenge, according to her, is the support of an understanding and encouraging family and the assistance of a maid.

The corporate management team that has an effect on the characteristics of this champion was interested in the new delivery strategy she proposed for the small project, although she faced opposition from her colleagues. Her strong character and experience taught her how to deal with such opposition and how to negotiate with top management. Hence, as a female cannot present an idea alone, she acknowledged that she needed support, so she contacted a friend in the management team who supported her. The technology she needed, such as AutoCAD software, was granted and she was empowered to follow up the project alongside the junior staff member of her choice. However, the work environment was not supportive at the beginning and throughout the duration of the project.

Even after she presented the brief feedback and performance report, the culture did not accept the change in strategy, and the workplace environment was not supportive and did not share knowledge in the form of information, thoughts, or ideas.

2. Effective innovation management:

Because of her experience working in innovative organizations such as COM IV, Ex (2) has been managing innovative projects for a long time. She believes that projects have been affected by the following factors:

- Corporate management: Stated formerly, it provided her with the necessary resources to perform the project according to a tight budget; however, she needed the support of one male in top management.

- Team effect: The team she chose for the project—although led by a junior—was motivated, skilled, qualified, excited, and had confidence in her and their leader. They understood what was required and did it effectively.
- Stakeholders: The corporation needs projects to be completed in the time frame specified while saving costs as much as possible, which was done on this project. The client needed to meet a professional engineer in his meetings, and that was handled by Ex (2), who attended with the junior. They supported the project team and encouraged them.
- External factors: The government has no effect on COM IV, as no regulations are effective in the UAE regarding women in the workplace, according to her.

3. Outcome:

The project was executed and had several outcomes that saved costs, provided internal satisfaction for the junior engineer—who was enjoying the job because it was a simple project—and reduced professionals' time and recognition, as a female innovator in the sector encouraged and motivated others.

It can be stated that hypothesis 1 and 2 are satisfied here.

8.5 Case 5: COM V

The Company

It is a semi governmental company, where 60% is owned by the government, and the other 40% is owned by shareholders. COM V is basically a service company that is known and responsible for the Dubai terminals. It constructs and operates the water and airports' terminals. COM V has a social responsibility towards the country and its people, and it is committed to "meet and exceed customer expectations," as stated on the website.

According to their official website, the COM V main port is ranked among the top ten container ports worldwide. They handled 11.6 million cargo units in 2010 and serve around 100 shipping lines, placing it among the leading hubs in the world.

To achieve all this, COM V has been motivated to meet the expanding needs of its customers and continuously upgrades its supply machinery and infrastructure to handle cargo more efficiently. This leads to the innovative project of this case which is the cruise terminal. This project, as described on the website, "has won the Middle East's Leading Cruise Port award four successive times at the World Travel Awards between 2008 and 2011." According to the marketing department in the tourism authority of Dubai, the growth in cruise tourism to Dubai is expected to grow more than 58% by 2015. Their study also showed that between 2008 and 2010, tourism increased 30%. In other words, it has grown from 100 ships and 260,000 passengers to 120 ships and 390,000 passengers. Continuing on this track in 2011, the growth reached 135 cruises and 475,000 passengers.

It is worth mentioning here that COM V's mission statement says that excellence, innovation and profit are what drive excellent customer service. The company's values also include commitment, profitable growth, responsibility, excellence and innovation.

The work environment is formal, where there are several levels that cannot be skipped. However, in reality an employee can approach the manager or top management directly at any time.

Interview and observations:

The female project manager interviewed and observed the project manager of the cruise terminal (E.L (3)). She holds a bachelor degree in interior design and masters in project management, in addition to attending the (LDP) Leadership program that was offered by COM V as recognition for her innovative ideas. Her position at COM V is a manager of interior design.

After her graduation, she worked for a government office in the engineering department where COM V is a client. However, after two years the department closed and instead of bringing new employees who are not familiar with the projects of COM V, she among a few of the employees in that department was chosen to join COM V because of their reputation and performance. She has been working with COM V for three years.

According to her, when she chose to study interior design, the common idea that this discipline is feminine eliminated any social or family opposition. Therefore, all were supportive. When she entered the field after graduation, she discovered that there were two sides to interior design. One is the soft side where you only have to draw the design, select the materials and check the shapes and colors. The other side is harder, where you have to go to the site to supervise the execution, inspect and make sure the design is followed. This side was not expected by the community to be done by a female and this side is the side on which E.L (3) has worked.

Her role at COM V was only the soft side for a few months until she spoke up and talked to her manager about it. She said that she was not using her capabilities and that her area of study falls under faculty of engineering, meaning she also studied construction. She convinced him that she could do the hard side of the interior, and she received encouragement from her manager who was surprised by her personality and confidence. Since 2009, she has been doing and implementing the design, going through the tender, appointing the contractors and following up with them. It is worth highlighting here that she studied project management to strengthen her degree as an interior designer so that others would think it reasonable that she could follow up with the construction jobs.

For the challenges she faced, E.L (3) argued that after her first project, she noticed that it was a hard job where she had to stay late, sometimes till 8 p.m. or 11 p.m., which caused family problems. However, she is not married, so she does not face the conflict of finding the balance between work and life. Another challenge is the fact that she was the only woman in the project development department that consists of 30 employees from 2009 to 2011. In 2011, COM V hired a female architect, bringing the total to two females among 30 employees. Her challenge as a female among a majority of men is the need to prove herself. She stays late to finish her work, and she volunteers for any project that is challenging even when others will not because they only want to work certain hours. As a result, her male colleagues tell her, “You do not good time management.” For her, it is an opportunity to work hard while she is single; when she is married, she may not be able to do this.

Working hard made her visible to the top management, which resulted in a promotion from a team member to a team leader by 2010.

As a leader, when she is assigned a project, she goes through mechanical, electrical, and plumbing (MEP) drawings and starts forming her team, which consists of four members with more than seven years experience and ages that range from 30s to 40s. The team consists of a mechanical engineer, an electrical engineer, and a civil engineer. Her way of leading is, according to her, “lead by example.” Therefore, the relationship among the team members can be described as a friendship in which they bring in ideas and suggest ideas as they think of them. When an idea is seen to be beneficial, she as the leader takes it up to her manager and identifies that team member who came up with the idea, so that the member can be recognized. If it is implemented, she lets that team member manage and execute it.

Another example is when the human resources (HR) department allows her to choose which of her team members will attend training courses. When this occurs, she gathers her team and tells them that HR sent her a course list, and that the team members should choose any number of courses they would like, with the condition that those courses should not affect their work performance. In addition, she tells them that they do not have to stick to the list, but can suggest whatever course they need, and she will work on convincing the management. It can be noted that E.L (3) empowers her team members and helps them grow.

In fact, observations show that an employee from another team requested to transfer to her team because she is a trustworthy, hardworking, and friendly leader. When she gives a task to her team and does not receive a response, she repeats the order two times and then uses an assertive tone, which—according to her—rarely happens.

In addition, E.L. (3) is sometimes approached to solve issues related to other departments. For example, there was a misunderstanding between two departments that resulted in a delay of a project for two weeks. Each party was waiting for a certain third party to hand over a task so that they could continue their work. However, the third party was not contacted by any party, as each department depended on the other to contact that third party. E.L. (3) received an email from one of them stating the problem, although she is not involved in those departments. She contacted the three parties and cleared the matters related to their project, and the project was submitted.

Innovation is encouraged by the top management at COM V. Hence, any idea that is beneficial in terms of profit, comparative advantage, or social value is welcomed. The project mentioned previously, “cruise terminal,” is managed by E.L. (3). The project is to build three cruise terminals with a walking area and facilities for tourists. Her innovative idea was presented in a meeting that is held quarterly by the director of COM V and each department. Being the only female in the department, she was asked to share her opinion on the project. She said:

“As this project presents a high social value to the local people of Dubai, we need to ask them for their suggestions and involve them, although it is a project of our company.”

Her idea was to involve the public by asking them for their opinions on this project through a forum or survey. This is because this port has a history and is considered to be part of the region’s heritage. This port was supposed to be modified and renovated by a well-known developer in Dubai; however, due to the financial crisis the project was stopped, leaving the port 40% demolished. This resulted in complaints from the local public, who lost a heritage place. COM V took the project from that developer to complete it. Hence, E.L (3)’s idea of involving the public was considered by the director. Involving the public reduces the risk of future complaints

and opposition to the design. Her idea was recognized, and she was asked to make a presentation in the forum, which she did. Now she is following up on the project.

The reward of innovation in COM V ranges from recognition to bonuses and training opportunities. As was mentioned previously, she was offered the LDP, which lasts for one and a half years. It is worth highlighting that COM V has a system called the “suggestions reward system” (SRS), where employees can log in and submit their ideas for any department or purpose at any time. If the idea is profitable, the person will receive a percentage of the monetary value.

Stakeholders in this project are the Dubai Police, the Tourism Authority, Dubai Customs, port management companies, cruise lines, and others. Each group has its own requirements. Her job is to meet each of them individually and learn their requirements, study them, and prepare drawings. Then she sends them to the stakeholders for comments. The problem was in not setting a time limit for the comments to be sent in by the stakeholders, which resulted in wasted time.

So, she stated a deadline, and they all submitted their signed copy of the drawings. Nonetheless, they only give some input and affix their signatures on the final drawings, and no further involvement is made. Their only contact occurs during progress meetings, where a representative of each stakeholder attends and gets the progress report. The stakeholders themselves usually do not attend such meetings, so she has to send the report for their information.

According to E.L (3), “Involving people is always the key for any successful project.” Hence the goal of this innovation is to provide social value and internal satisfaction, being able to do the job of a consultant, who sheds light on the capacity of the champion.

In conclusion, to enhance innovation, a woman needs to be an example to others by working hard and presenting such ideas that raise the level of competition. Because she cannot go ask them to innovate directly, being an example is the key.

8.5.1 Analysis of Case V:

1- Characteristics of a champion of innovation:

E.L (3) is a young woman who has made a tremendous professional growth. She is a transformational leader, as can be interpreted from the way she deals with her team members and the company. She empowers and involves the team members in all decisions; she inspires them and works hard to set an example. At the company level, she tries to set an example so that the level of competition rises and eventually more innovative ideas come out from other colleagues. E.L (3) shares all the knowledge and information she has with her team members and anyone in the organization because she is willing to help them as much as she can. Her communication skills are usually used for solving conflicts not only in her department but also outside of it.

Because of her understanding and the climate she has built for her team, she does not come across conflicts often. When conflicts do arise, she tries to solve them through discussion and assertiveness. Her understanding of the customer's needs helped her come up with the idea of involving the public in a project that has many stakeholders. She is organized and hard working and sets an example for others to look up to. The main challenge she faced involved working long hours, which was not socially acceptable. Interior design is commonly considered an office job, but she stayed late at the site with the male workers.

Corporate management was interested in the idea she presented, as it would eliminate the opposition that was faced by the former company, which had worked on the same project. Hence, she was appointed project manager, with the authority to make decisions regarding the project's progress. Corporate allocated the necessary resources and technology. However, the surrounding environment was not supportive. They accused her of having no time management skills and doing things she did not have to do. Her team provided the support she needed; they were her friends and helped her achieve her goals.

2- Effective innovation management:

Innovation management was performed by E.L (3), who came up with the idea by thinking of the social value that the project presented. She then formed the idea and

presented it, proving that it would be beneficial in the long run, both for competitive advantage and social value. In following up on the idea and managing it, E.L (3) needed to consider:

- Corporate management: They were supportive, which facilitated the paperwork and inter-organizational procedures and insured the availability of required resources.
- Team effect: Being skilled and qualified, having confidence in their leader, sharing knowledge and communicating effectively helped the team share ideas and develop a better understanding of the project's customers' needs.
- Stakeholders: The corporate strategy encouraged and rewarded her for innovation. Her idea was received publically as an addition to the heritage of Dubai, meaning it gained public support. Nonetheless, the formal stakeholders were not involved in every aspect of the project and were not helpful. They only signed the first draft of the project and did not even attend the progress meetings.
- External factors: As this is a semi-governmental company, they did not face any governmental regulations that affected their project or their internal processes.

3- Outcome:

The innovative contribution of E.L (3) from that idea was raising the level of competition in the company so that others would be motivated towards innovation and the enhancement of the projects' performance. As was previously mentioned, the project is considered to have social value, and the idea of involving the public—as simple as it is—resulted in E.L (3) being rewarded by recognition and internal satisfaction for being a female capable of innovation. As for the hypothesis, it can be seen that hypotheses 1 is satisfied. Conversely, hypothesis 2 is not satisfied because the stakeholders were not involved.

Chapter 9

Discussion

9.1 Discussion:

It can be seen from the analysis of the cases that Emirati women in the construction sector face many challenges and are capable of dealing with them. This can be seen in the table below:

| Cases | Challenges | Technique |
|---------|---|--|
| Ex.(1) | -Being underestimated. -Lack of support. | - Work on her own to prove the value of her innovative idea and then present it. |
| E.L.(1) | - Credit for her work goes to others. - Workers' attitude. | - Keep the hard work visible to all. - Ignore them and do the job. |
| E.L.(2) | - Work/life balance. - Continuous need to prove herself. | - Time management by finding a job at a government office and having a full-time house maid. - Work hard. |
| Ex.(2) | - Work-life balance. | - Support from family. - Time management by having a full-time house maid. |
| E.L.(3) | - Long, socially unacceptable working hours. | Work hard and innovate to set an example that will elevate the level of competition in the workplace and convince her family that she is gaining experience and making a difference. |

Table 9.1: Shows the challenges along with the technique used to overcome them.

Comparing these challenges to those mentioned in the literature in chapter five (Figure 5.1), shows that they are the same, except for the recruitment challenge – pay, promotion, incentives, and so on- that is not faced here in the UAE by females. In the case studies the only difference between males and females in terms of promotion, pay and incentives is proven to be performance evaluation which may imply injustice. For example, performing differently or trying to innovate may be under evaluated. The other challenge that is not shown in the cases is the lack of role models, which is seen to be a reason for the lack of women within this sector.

Women are managing innovation effectively as shown by the successful examples; however they need the support of the organization, their team, their families and the community.

Briefly linking the cases analysis to the objectives of the research, the first objective was to examine the challenges faced in realizing successful innovation. It was seen to be achieved in the field in a way that if an innovation saves money or time, it is most probably approved by the management especially in the time of financial crisis. The second objective is best illustrated by figure 2.1. This figure shows the challenges facing women in their managerial positions and their contributions. The third objective was satisfied in table 9.1. This objective is investigating the challenges facing women professionals in the construction sector specifically. Also the challenges are mentioned formerly in Figure 5.1, and Figure 2.1. The fourth and final objective about identifying the contributions women can make to enhance level of innovation in construction is best seen to be fulfilled by the role models presented in the cases. Those women were able to innovate and became role models for other females entering this sector. They showed them that it is possible to excel and reach higher positions within such sector. Their innovative contributions are a:

- New commercial system that is effective and easy to operate.
- New checking process using a simple checklist that saves not only time and cost but also effort.
- New policy in dealing with the contractors and managing projects in hard times, such as the financial crisis.
- New project that has social value and is financially beneficial.
- New delivery strategy that saves money, time and has created an opportunity for juniors in the company.
- New idea that enhances the performance of a project and helped in eliminating potential public opposition.

Hence, linking all of the above to the conceptual framework, women in the UAE are capable of enhancing the level of innovation in this static sector if they have the attributes and skills required – figure 5.1- as well as the support system of family,

management, team and community. The outcomes of their effort might vary from being as small as saving time to as big as creating new systems.

Consequently, women in the UAE have enhanced the innovation level in the construction sector. Not only on site during execution, but also during the planning and management of projects. They have elevated the level of competition in their companies, setting examples for others - both male and female – to be motivated in order to innovate or make changes.

Research-based recommendations were mentioned throughout the literature review chapters regarding the issue of women's contribution to the workforce in general and to the construction sector in particular as well as highlighting the role that governmental bodies are and should be playing regarding women's effective involvement in all sectors.

9.2 Limitations

This chapter presented five case studies of women, who have enhanced innovation in the construction sector in Dubai, as well as the challenges they faced and how they dealt with them. There were a few limitations faced during the research:

- The short time period may have affected the selection process as some of the companies were not able to set up a meeting within the period of the research, resulting in exclusion from the study.
- There is not a site engineer in any of these cases; all of the participants worked in the office and only went to the site for inspections, which may be related to being a female. This fact affected the research because only a portion of the challenges that females face on the site were included in the analysis.
- Sensitive questions regarding social and family expectations were a limitation because some of the women interviewed were reluctant to share their experiences about such personal issues. This presents a major challenge that must be addressed in future research.

The next chapter will summarize the findings, present conclusions and implications, and offer recommendations for future research.

Chapter 10

Summary, Conclusions and Recommendations

10.1 Summary:

This paper is aimed at answering the question of how women can enhance the level of innovation within the construction sector in the United Arab Emirates. It started by reviewing literature on the aspects related to women in the workplace in general, demonstrating the challenges they face and the opportunities they offer to their respective organizations as females, in addition to the factors affecting women's performances in the workplace, such as the organizational culture, governmental regulations and having an immigrant house maid. The second chapter of literature discussed the definition of innovation, innovation process and its management, which present a challenge for any company, and finally showing the role of innovation champions and their qualities. The third chapter in the literature showed the area in the construction sector where innovation is most likely to take place, such as value and risk management, supply chain management, contracts, and during the execution of projects. In addition, this chapter shed light on the project manager role as a champion of innovation, responsible for managing the innovation process during a construction project. Also discussed were the innovation types in construction and the challenges in recognizing it.

The final chapter in the literature discussed women's situation in the construction sector, relating all chapters together by showing where women are and what their role is within this sector, along with the challenges they face as project managers and engineers. This chapter found that the characteristics of a champion of innovation are similar to those of working women; hence women may be the champions of innovation in this field. After the literature was reviewed deeply, the conceptual framework was formed summing all the previous knowledge up in the form of a graph and five hypotheses that set a criterion for assessing the cases that are studied from real life construction companies. The five cases presented five women from five different construction companies in the UAE. Each case introduces the experience of a woman, from entering this sector to her current position, including the challenges faced, the way she dealt with them, her innovative contribution, and its outcome. The analysis of the cases showed each of the five women to be a role model who encourages others to follow in their footsteps and challenge all social, personal and professional barriers.

10.2 Conclusions and Implications:

This paper has discussed the contributions women in the UAE may make to the masculine-dominated sector of construction. In Conclusion, the main points discussed were:

1. The attributes of women in managerial positions and the challenges they face.

Women in managerial positions such as project managers in the UAE are highly educated as was mentioned in the literature, they are emotionally intelligent, understand customers needs, organized and multitask easily, have the ability to solve conflicts, are quality focused and risk aware, they share knowledge, they are loyal and committed, they demonstrate better enhanced productivity and they have fewer absence and turnover records than men counterparts. On the other hand, they face challenges such as the men's attitudes, finding balance between work and family, being underestimated, having a lack of role models, religious and social expectations and the recruitment aspects (pay, incentives, promotions, and so on).

2. Innovation definition, levels, process and its management in construction

Innovation is generating, developing and implementing an idea that is new to the organization that has commercial benefit. In the construction sector, innovation might happen at any stage from preparing the drawings to the final layer of painting. Hence, levels for the construction sector innovation might be from level one to level four – mentioned in Chapter 3-. The attributes mentioned above are more than the characteristics of a champion of innovation. Thus, women project managers can be the champions of innovation. They can face the challenges that those champions usually face such as communication. Women are seen from the cases to be transformational leaders, understand the needs of each person and emotionally intelligent which helps them in solving conflicts quickly and quietly. From the cases, they have proven to be effective in managing innovations.

3. Women's situation, barriers, and effect in the construction sector

The sector is known to be male-dominated and the UAE culture as well as the Middle East's culture does not accept the idea of a woman working on site alongside male workers all day. Organizations in the UAE such as DWE and GWU were formed to empower women to enter the workforce and choose whatever sector they wish to work for in order to excel. Women affect the climate of innovation positively by raising the level of competition in the organization. In other words, by women setting an example for men, they will be motivated to innovate. Organizations have to support women and recruit them in order to benefit not only from diversity, but also from their effect on the climate of innovation.

4. Case studies of women in the construction sector

The cases showed women's contributions to the industry in spite of the challenges each woman face during their professional life. These examples may encourage other young women and men as well, to follow in their footsteps and excel in their work.

Finally, the objectives were met in the following manner:

| Objective | Is met by |
|-----------|---|
| 1 | By the literature (Chapter 3 and 4). |
| 2 | By the literature, and proved by the second and fifth cases showing that being a woman with experience will lead her to manage innovations successfully and in turn enhance projects' performances within this static sector. |
| 3 | By the cases that revealed the challenges they face. |
| 4 | By the cases that showed the contribution women have made to enhance the innovation level in the sector. |

Table 10.1: Shows the objectives of the research being met.

The implications of the above conclusions can be summarized in two points. The first is that women have developed many qualities during their work in other sectors. These qualities will help them in overcoming the challenges of the construction sector, in addition to being champions of innovation due to their abilities

in managing innovations effectively. The second implication is the theory that having champions of innovation who are women, supporting and empowering them will present role models who will encourage other young females to join and consequently increase the number of women in the industry. This will in time change the nature of the currently static sector to be of a more diverse workforce, change-friendly and perhaps a more innovative sector.

10.3 Recommendations for future research:

As what is found in the UAE may not apply to other countries, carrying this research further is recommended to other Arab countries that may be in need of a change in their culture with respect to women's professional choices and contributions. Another issue is considering men's opinions regarding the feminine innovative contributions within such a masculine sector as construction. Another topic for future research is to investigate the hidden dimensions of empowerment and its effect on understanding the discriminating behaviors.

Chapter 11

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Chapter 12

Appendix:

Table 4.2: Effect of the innovation classification on the project-based industries
(Adopted from Lim and Ofori 2007, p.976).

| Innovation | Proposed business strategies | Specific recommendation |
|------------|---|---|
| Type 1 | Establish communication links with clients to hasten the flow of consumers' demand signals and information to company | Develop cooperative relationships with clients in the early tendering phase of the project to determine the tastes, demands and needs of the consumers. This would facilitate the selection of an appropriate innovation strategy according to consumers' willingness to pay for the output of the intended innovation. In addition, it allows contractors to develop strategies with the clients, the intentions of the contractor in developing an innovation specific for the project for shared monetary gains. |
| Type 2 | Maximize secondary monetary returns from Type 2 innovations | Complement Type 2 innovations with good project management techniques such as early project planning at the design stage and regular project meetings with key personnel to reduce level of rework and project delays. |
| Type 3 | Maintain a sustainable commitment to innovation | Establish the decision to implement the innovation project based on its returns over the life cycle of the innovation process or product and not on initial expenditures. Identify and promote to all employees the potential contributions of the intended innovation to the company's competitive advantage and long-term business strategies. |
| | Cultivate an innovation culture | Encourage innovation mindset among employees and introduce appropriate incentives and rewards. Encourage the documentation of construction work processes, especially new and novel construction methods. |

Table 4.3: shows examples of some advanced technologies (Adopted from Manley and Mcfallan, 2006, p.914).

Design

- Computer-aided design
- Computerised visualisation techniques
- Simulation technologies
- Systems dependent on CAD files
- 3-D CAD files

Materials

- Fibre composites
- Foam bitumen
- Geotextile fabrics
- High performance concrete
- Noise inhibiting road surface materials
- Stone mastic asphalt

Plant and equipment

- Digital videos of road surface condition
- Electronic distance measuring device (EDMD)
- Global Positioning System (GPS)
- GPS-guided equipment
- Laser-guided equipment
- Paving/rehabilitation train
- Pug mill cement/lime stabilisation processes

Systems

- Bio-remediation clean-up
- Health monitoring of road pavements/structures
- Recycling asphalt/concrete
- Remote sensing and monitoring systems

Table 4.4: shows examples of some advanced practices (Adopted from Manley and Mcfallan 2006, p.914).

Computerised practices

- Computer networks (LAN or WAN)
- Computerised estimating software
- Computerised inventory control
- Computerised modelling
- Computerised pavement/bridge investment analysis (eg. HDM4)
- Computerised project management
- Digital photography
- E-mail
- Intelligent transport systems
- Office-to-site video links or video conferencing
- Online remote-construction management
- Website

Contracts

- Alliance contracts
- Cost-reimbursable-performance-incentive contracts
- Design and construct contracts
- Design/Build/Fund/Operate (DBFO) contracts or public-private partnerships (PPPs)
- Managing contractor
- Partnering on road projects

Organisational practices

- Documentation of technological/organisational improvements developed by your organisation
- Long-term collaborative arrangements with other businesses
- Quality certification (e.g. ISO 9000)
- Staff training budget
- Written evaluation of new ideas in order to develop options for your organisation
- Written strategic plan

Questions asked in the interviews:

6. Champions of Innovation:

- What are your qualifications?
- Why did you choose this path (areas of study, employers, etc.)?
- What challenges did you face (if any) as a manager/engineer, in the sense of what day to day work, promotion, when proposing a new idea, being part of a team, trusted with a major responsibility, etc.?
- How did you overcome them (immigrant, government regulations, etc.)?
- Would you say you are an effective leader within your current project? Explain using examples (leadership style, conflict management, communication, emotional intelligence, etc.).
- In your current project do you see new ideas being introduced? Give an example of such an idea? What is your role in making sure this new idea is successfully implemented?

7. Organization :

- Do you think you are an innovative organization? Why? What does senior management do to help you and your team to be more innovative on your current project (culture, work environment and strategy)?

- Do you receive support and rewards/acknowledgement/resources for your innovative work?

- Is innovation implanted in your strategy? Is it fundamentally part of your job?

- What role do you play in enabling the organization to be more innovative?

8. Stakeholders:

- How do you ensure the effective involvement of the stakeholders in your current project?
- What difference for you does it make when you have stakeholders involved/support for introducing and implementing a new idea (resources, access to loans, etc.)?

9. Team:

- Can you describe the team you are working with (fresh graduates, skills, abilities, nature of the relationship they enjoy, the support they give you, etc.)? Give examples.

10.Outcome:

- What was the outcome of the innovation (did it involve champion, team, and organizational support, and stakeholders' involvement, etc.)?
- Would the expected outcome please the project team, senior management, and the stakeholders? Why do you think so? What has been enhanced?