The key Barriers to Implementing Sustainable Construction in West Bank - Palestine

A dissertation
Submitted in Fulfillment
of the Requirements for the Degree of
Master in Business Administration (MBA)

Prepared by: Najah Zuhair Osaily
Supervised by: Professor Stuart Wallace

Robert Kennedy College / Zurich
University of Wales / UK
March - 2010

The key Barriers to Implementing Sustainable Construction in West Bank - Palestine

Prifysgol Cymru
University of Wales

This degree is validated and awarded by the University of Wales, UK.

Reference No. RLT/HFH/1012

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Declaration:

I; the undersigned; declare that this dissertation is all my work, except where indicated

_____

Najah Zuhair Osaily

March 2010

Abstract:

The main goal of this dissertation was to clarify and prioritize the key barriers to implementing sustainable construction in West Bank – Palestine. The scope of the study was limited to seven factors: political situation, legal aspect, people, cost, technology and time. Selected variables were chosen to see the impact of these variables on implementing sustainable construction; these variables were: education, experience, classification, number of employees and location. The study covered West Bank only and from the contractors' point of view. This study relied mainly on analytical descriptive and field study methodology. A questionnaire was designed and applied by 106 registered contracting companies; classified in PCU as first, second and third degree. In addition short interviews were made with selected four leading contractors. The results of the study illustrated that political situation was the major barrier that prevents implementing sustainable construction. In addition; the deep analysis of the main categories showed that the lack of comprehensive, strategic planning and lack of cooperation with consultants are main causes that prevent implementing sustainable construction.

No effect was attributed to educational level, experience, specialization and classifications of the contractors on the main barriers to implementing sustainable construction. The contractors considered that hiring large numbers of employees will increase the barriers to implementing sustainable construction; therefore technology will be another barrier due to the high cost to attain technology for large numbers of employees. The contractors living in southern area considered that the barriers to implementing sustainable construction increased due to location.

Based on these findings detailed recommendations were presented in the study. The researcher considered the argument of implementing sustainable construction in Palestine as ongoing research that must be investigated by others; to have the construction chain point of view.

"You must be the change you want to see in the world"

(Mahatma Gandhi)

Dedication

To the memory of my parents who emphasized the importance of education and helped me throughout their lives, they have been my role-model for hard work, persistence and personal sacrifices; they instilled in me the inspiration to set high goals and the confidence to achieve them.

My father; who taught me that the person who takes responsibility with courage, persistence and conviction and never compromises the quality of life is a person who is capable to make tomorrow better than today; for himself and for the people around. He was a person with a vision and good judgment.

My mother; the simplicity, the unconditional love, she taught me that the real happiness is to make people happy by lending a hand and thinking of others.

Life is a precious gift that we should cherish and invest well; to make it worth living for us and for the generations to come; we must do our best and then; leave the rest to God…

Acknowledgement:

First and foremost my deep gratitude would be to God, I am grateful for what I am and for everything I have….

It is an honor for me to thank Professor Stuart Wallace for his support and great efforts; his supervision and valuable feedback. I would also like to express my special thanks to the Palestinian Contractors Union (PCU), Palestinian Central Bureau of Statistics (PCBS) and all the contractors who filled the questionnaire; without their help and their efforts; this dissertation would not have been possible.

My heartfelt appreciation to my wonderful family; my brothers and sisters for their support and encouragement in so many ways…. specially my brother Naser, who was standing beside me all the way, Issam; for all the efforts and time he shared and my sister Raja for all the comparisons and arguments we made.

Special thanks to Robert Kennedy College and University of Wales for this great opportunity and fruitful journey.

To my friends; colleagues and all who made this journey easier with words of encouragement and valuable discussions; thank you doesn't seem sufficient but it is said with appreciation and respect.

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Acronyms List

Acronyms	**Expression**
SMEs	Small medium enterprises
SPSS	Statistical package for the social sciences
PCU	Palestinian contractors union
SESP	Social economic stabilization plan
PCBS	Palestinian central bureau of statistics
GDP	Gross domestic product
WB	West Bank
WBGS	West Bank and Gaza strip
PECDAR	Palestinian economic council for development and reconstruction

Chapter 1

Introduction

1) Preface:

The construction industry plays a powerful role in sustaining economic growth, in addition to producing structures that add to productivity and quality of life (AGC, 2009). This industry is large, complex, diverse and covers a wide range of business interests and activities, united by their common usage and development of land (Corporate watch, 2004). The construction sector composed of contractors, consultants, suppliers and product producers. It is dominated by SMEs with a relatively small number of large companies (UK Trade & Investment). The relationship between construction activities, and the built environment on one hand, and sustainable development on the other, is both significant and complicated. Construction uses more raw materials than any other sector, and the creation and operation of the built environment accounts for an important consumption of natural resources (European Commission Enterprise and Industry).

Urban planning, the built environment and infrastructure are critical for the growth of towns, regions and countries, for the competitiveness of the economy and for the economic, cultural and social life of the inhabitants. The created assets have very long lives and constitute a considerable proportion of our common environment. Extensive change is now taking place in many countries. The increasing need for rapid readjustments, renewal, innovation, adaptation to climate changes and restructuring demands a creative, effective, and sensitive construction sector (Sustainability Journal from the Swedish Research Council Formas,2008). As a result, the concept of sustainable construction emerged; it is proposed that sustainable construction is a way forward to improve performance of construction industry, making it more sustainable (Nurni, 2007).

In light of the above and the need for restructuring Palestine; developing sustainable construction is a strategically important Goal in Palestine as well as in other countries. We need to think of the future, being sustainable is one way in which we can guarantee a future with the resources that we require (Sustainable Construction Organization).

The construction sector is one of the key economic sectors and the main force motivating the Palestinian national economy. In 1994, the construction sector has witnessed noticeable expansion. This has resulted in the recovery of the construction contracting profession and Subsidiary industries; the construction sector has occupied the foremost position among the rest of sectors, mainly attracting investments and creating new jobs (PCU, 2008); Construction sector contributes 33% to the Palestinian GDP. Employs about 10.8% of laborers directly, and 30% indirectly in factories related to the construction sector and other service and productive sectors. This is a large proportion covered by this sector, thus positively affecting various economic, social, educational and vocational sectors in addition to other Palestinian institutions (PCU, 2003).

Through a complementary process, several parties contribute to the Construction sector. Such stakeholders are the public and private sectors, universities and institutes, Donor countries, international financing institutions and banking sector. Stakeholders make necessary services available; provide necessary materials, fund construction projects, and organize the construction contracting profession according to the laws and regulations enacted by governmental institutions (PCU, 2008). However this sector is deeply fluctuating and hence its contribution to growth is deeply affected by vast numbers of barriers. The need for clarifying and prioritizing these barriers that prevent

the implementation of sustainable construction; leading to the importance of this research and the main question: "what are the key barriers to implementing sustainable construction in West Bank – Palestine?"

2) Research Questions:

The Palestinian economy, unlike other economies, lacks national strategic control and a self monitoring system, because it has never been under full Palestinian sovereignty. The economy has experienced dramatic changes. Some of These changes are linked to factors such as the volume of external donations. The repeated closures imposed on the movement of people and goods into the Palestinian territories. Multiple challenges face Palestinian development efforts, whereby recovery and reconstruction must proceed (Rodney, Christopher (UNCTAD, 2006).

Construction sector faces numerous impediments preventing sustainable growth and development. These impediments include: operational factors; financial constraints; limited marketing; human resource management; expertise; limited strategic planning; ineffective Information Technology (Rodney, Christopher, Sherif and Gary, 2003); regulations; politics, etc. These factors are all contributing to fluctuation in this sector.

In response to the urgent need for knowing the reasons behind the fluctuation and the severe decline in construction contribution in the GDP and The importance of this sector in achieving sustainable growth in economy therefore rebuilding the state of Palestine. Here emerges the need to clarify and prioritize these barriers that prevent implementing sustainability in construction. Thus, leading to the importance of this research and the main question: What are the key barriers to implementing sustainable construction in West Bank – Palestine?

Considering the vastness of this subject; the researcher decided to highlight seven key barriers that prevent implementing sustainable construction - time, cost, market, people, technology, legal aspects and politics. - To avoid superficiality.

Another question is raised to clarify the role for the following variables on the main question:

a. Education level.
b. Experience.
c. Specialization.
d. Classification.
e. Number of employees.
f. Location.

In addition; to shade the light on:

1. What is the status quo of construction in West Bank – Palestine?
2. What are the drivers of sustainable constructions? How sustainable construction can be achieved?

3) Research Objectives:

1) Identify, categorize, and prioritize a general set of barriers to implementing sustainable construction in West Bank – Palestine.
2) Recognize the role of experience, education, specialization "field of work", classification, number of employees and location in increasing or decreasing the barriers to implementing sustainable construction.
3) Recognize the main Keys to achieving sustainable constructions.
4) Emphasize on the importance of achieving sustainability.
5) Highlight the characteristics of construction sector in West Bank.
6) Put the result of this research for the service of this sector to increase the awareness of the importance of this study and to work together to eliminate these barriers in order to move forward to achieving sustainable construction.

4) Research Importance:

To maintain and to increase the contribution of this industry in the economy through:

1) Reducing cost by saving energy, resources and time.
2) Saving environment by reducing waste and pollution.
3) Focusing on increasing profitability through:
   (a) Efficient use of resources.
   (b) Adopting modern methods and technology for implementation.

5) Limitation: This research will focus on Palestinian contractors living in West Bank – Palestine; classified in Palestinian contractors union (PCU) for the year 2009 – 2010 as first, second and third degree in the fields of: building, infrastructure, electromechanical and roads.

Key words: sustainability; construction; sustainable construction

Chapter 2

Construction Sector

1. Introduction:

The Construction sector comprises establishments primarily engaged in the construction of buildings or engineering projects (e.g., highways and utility systems), (Kincannon, 2004).

Engineering and construction are unique combination of a specific need and design in a process that yields engineering works. The construction profession offers the opportunity to create works for the benefit of mankind, but in turn those who work in this profession accept substantial responsibilities (Schexnayder and Mayo, 2004). Construction has many characteristics common to both manufacturing and service industries. Surely, as in other industries, there are physical products. But in other ways, construction is more like a service industry because it does not accumulate significant amounts of capital when compared with industries such as steel, transportation, petroleum, and mining (Barrie & Paulson, 1992), (Ahmed, 2008).

There is no doubt that construction is a key activity within any economy; it influences, and is influenced by, the nation's gross domestic product (GDP) (Cox et al, 1998, cited in Madi, 2003). The construction sector is strategically important for Europe providing building and infrastructure on which all sectors of the economy depend. With 11.8 million operatives directly employed in the sector, it is Europe's largest industrial employer accounting for 7% of total employment and 28% of industrial employment in the EU-15. It is estimated that 26 million workers in the EU-15 depend in one way or another on the construction sector (European commission Enterprise and Industry).

According to the Associated General contractors of America (AGC) construction sector provides good-paying jobs for 7.2 million people. Construction also makes a large contribution to gross domestic product (GDP), totaling $1.14 trillion or 8.4% of GDP in 2007. The construction sector in Dubai contributed by 12% to Dubai's GDP in 2005, its annual average growth rate reached 27% during the period 2000-2005, reflecting the construction boom being witnessed in the Emirate (Belaid and Bader Al deen, 2007).

The construction industry is a paradox, in many ways. It is the largest industry, but the vast majority of its hundreds of thousands of participants are small business (Barrie & Paulson, 1992). In addition, Clough and Sears see that the construction projects are complex and time consuming. The structure must be designed in accordance with applicable codes and standards, culminating in working in drawings and specifications that describe the work in sufficient details for its accomplishment in the field (Clough and Sears, 1994). Also, the field of construction is as diversified as the uses and forms of the many types of structures it produces. However, construction is commonly divided into four main categories:

1. Residential construction.
2. Building.
3. Engineering.
4. Industrial construction.

Although there is some overlap among these divisions and certain projects do not fit nearly into any one of them (Clough and Sears, 1994). The construction industry is inherently an uncertain industry; this uncertainty arises from the nature of the industry itself- the competitive tendering process, the company's turnover, site production rates and the weather are all variables (Harris & McCaffer, 1998). Ritz thinks that a short analysis of construction history informs a small number of things about the construction industry (Ritz, 1994):

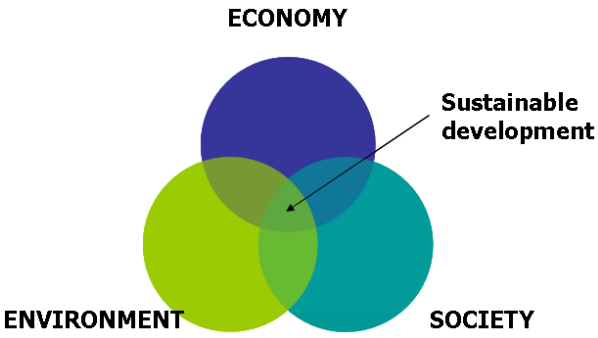
1. Construction has a long tradition of creating structures and facilities promoting the progress of humanity.
2. Construction has provided a world civilization with a huge infrastructure, ranging from basic shelter to facilities in outer space.
3. Construction productivity and efficiency have improved greatly over the centuries.

As a result of the above, Barrie & Paulson concluded that "there is no clear definition as to just what the construction industry is. Certainly it must include the hundreds of thousands of general and specialty construction contractors. But for a real understanding; one must extend its scope to include designers of facilities, material suppliers, and equipment manufactures" (Barrie & Paulson, 1992, 6), (Ahmed, 2008).

2. Sustainability:

«Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. » This is probably the most broadly accepted definition of sustainability developed in 1987, by the World Commission on Environment and Development (the Brundtland Commission). Instead of sustainability, often terms like sustainable development sustainable prosperity or sustainable genuine progress are used. They more or less all mean the same as defined above (Time for Change Organization). Sustainable development includes three broad components; social, environmental, and economic; often known as the 'triple bottom line', as shown in Figure 1 (Mark, Dino, Chimay, Patricia, Malik and Jacqueline, 2005).

Figure 1: Themes of sustainable development:



For businesses; sustainability is a powerful and defining idea: a sustainable corporation is one that creates profit for its shareholders while protecting the environment and improving the lives of those with whom it interacts. It operates so that its business interests and the interests of the environment and society intersect. A sustainable business stands an excellent chance of being more successful tomorrow than it is today, and lasting success, not just for months or even years, but for decades or generations.

Increasingly, businesses are expected to find ways to be part of the solution to the world's environmental and social problems. The best companies are finding ways to turn this responsibility into opportunity. We believe that when business and social interests overlap, everyone wins (Sustainable business Strategies, 2009).

3. Sustainable Construction:

Sustainable construction can be defined as a construction process which incorporates the basic themes of sustainable development (Parkin, 2000; Chaharbaghi & Willis, 1999; Sage, 1998). Such construction processes would thus bring environmental responsibility, social awareness, and economic profitability; objectives to the fore in the built environment and facilities for the wider community (Langston & Ding, 2001; Miyatake, 1996; Raynsford, 2000; Chen & Chambers, 1999). The UK Government's strategy for more sustainable construction (DETR, 2000) suggests key factors for action by the construction industry by widening the basic themes. These include design for minimum waste; lean construction; minimize energy in construction and use; do not pollute; preserve and enhance biodiversity; conserve water resources; respect people and local environment; and set targets, monitor and report, in order to benchmark performance (Raynsford, 2000; Langston & Ding, 2001; Miyatake, 1996; Addis & Talbot, 2001; Ofori et al., 2000; Cole, 2000). Construction has a significant effect on quality of life: its outputs alter the nature, function and appearance of the towns and countryside in which people live and work. Sustainable development relies on long term planning, Schmid (2003) states that; 'the future of sustainable construction has its roots in past and present actions and the future depends on our (ethical) awareness concerning the consequences of our acts and deeds.' Van Bueren and Priemus (2002) state that sustainable construction is; 'the design, development, construction, and management of real estate such that the negative environmental effects of the construction, restructuring, and management of the built environment are reduced as far as possible. The construction industry addresses the three dimensions of sustainability; environmental, social and economic, in different ways (Adetunji *et al*., 2003). Environmental factors in construction encompass the use of natural resources, waste minimization, and energy and water efficiency to prevent a harmful effect on the environment. Social aspects include taking the stakeholders into account which include employees, suppliers and the community. Economic factors include the construction industry's contribution to economic growth and employment (Kristy, John and Geraldine, 2006).

4. Characteristics of the Construction Sector in West Bank – Palestine:

4.1 Glimpse on Palestine**:**

Palestine is found at the center of the world map, in a geographical location that connects three continents together making a cultural and economic bond between Asia, Europe, and Africa. Palestine today consists of the West Bank and Gaza Strip, forming the area of 6,020 km2; which is 23% of the total area of historic Palestine while it was under the British Mandate, before the Israeli occupation in

1948. The total population in Palestine is 3.8 million, 2.4 of them live in the West Bank in an area of 5,655 km2, and the remaining 1.4 million live in Gaza Strip in an area of 365 km2. Palestine and Israel are known to be the holy land of the three major religions in the world; Christianity, Islam, and Judaism.

Many cities in the Palestinian territories are considered to have religious and archeological significance since the beginning of time, as Bethlehem, Jerusalem, Hebron and Nablus are known for the religious sites found in them. Jericho is known to be the oldest city in the history of mankind. Hebron and Nablus are also known to be two of the most important industrial cities in Palestine, as Nablus is famous for its sweets and soap, and Hebron is known for its glass, stone and leather industries.

At present, the Palestinian territories are a part of Palestine before 1948. In 1950 the West Bank was under Jordanian control and was legitimized by Jordan and the United Kingdom. Gaza Strip was under Egyptian control at that time.

In 1967 the West Bank and Gaza Strip were occupied by Israel and are still under Israeli occupation to this present day (Palestinian American Chamber of Commerce).

Languages

Arabic is the official language of the Palestinian Territories. However, Palestinians are multilingual people, with English being widely spoken and used in business. Several other languages such as Hebrew, French, German, Italian and Spanish are also widely spoken.

Currency

The Palestinian National Authority has no national currency. Palestinian banks accept deposits and withdrawals of foreign currencies. Major currencies that are used in Palestine include the Jordanian Dinar and the Israeli Shekel. Moreover, the US Dollar is quickly becoming the most popular currency for both deposits and credits in the Banks (PalTrade, 2009).

Climate

Mediterranean – hot, dry summers and short, wet, cool winters. Mountainous areas usually have cool summer nights. Because of regional differences, temperature and rainfall vary depending on the topographic area. Areas include the coastal plain, Jordan valley, slopes, central highlands, and semi-coastal zone. Rain usually falls in the period between November and March with occasional snowstorms in the mountainous areas. Figure 2 and Figure 3 illustrate the flag and the map of Palestine:

Figure 2

Flag

Map of Palestine (Hebron Municipality, 2009):

Figure 3

4.2 Past and Current Market Situation:

4.3 Construction Contribution to GDP:

The construction sector in Palestine experienced a considerable growth in the aftermath of 1967; its share of GDP increased from less than 9 % in 1985 to more than 23 % in 1995. During that period the sector's contribution fluctuated in an upward long-run trend bounded by 9 % and 19 % from 1970 to 1980, and by 15,2 % - 23 % from 1989 to 1995 (PECDAR, 1997). However, it appears that in 2004 the construction sector's contribution to the GDP was reduced to 9 % due to the second Intifada in Palestine (World Bank, 2004; PCBS, 2004).

Due to increased demand from the first Intifada, and to accommodate Palestinian returnees from the Gulf following the first Gulf War, the construction sector experienced a steady increase from 1991 onwards.

The 1994 peace process accelerated this increase, particularly after the return of many Palestinians with the Palestinian National Authority (MAS, 2001). The construction sector became one of the key economic sectors and the main force motivating the Palestinian national economy, the sector has witnessed noticeable expansion and activities. This has resulted in the recovery of the construction contracting profession and Subsidiary industries:

a. By encouraging the investment of the Palestinian expatriates capital in the local construction sector.
b. Contributing in jobs creation for thousands of Palestinians. Therefore, the construction sector has occupied the foremost position among the rest of the sectors, mainly in the attraction of investments and creation of new jobs (PCU, 2008). Table (1) illustrates the construction Share in GDP for the WBGS - (Million US$).

Table (1) construction share in GDP 1972-1994

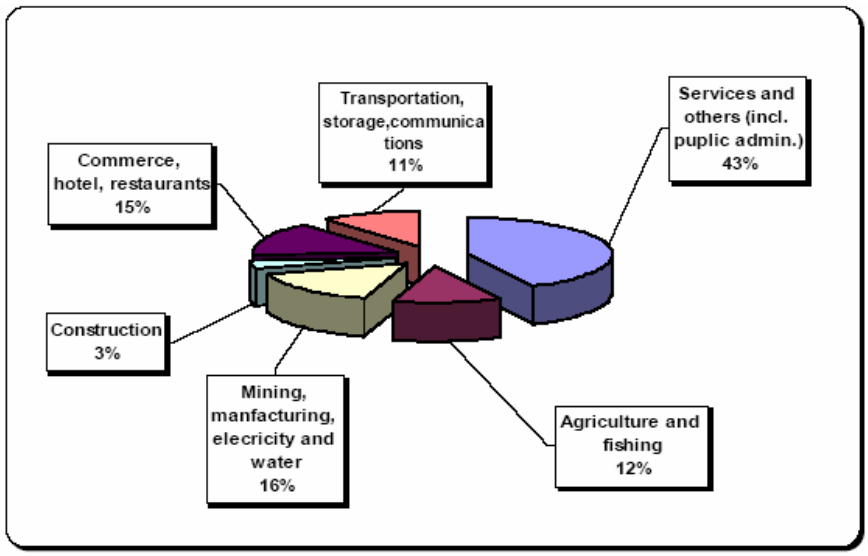
Item \ years	G.D.P	Construction Share %
1972	276.2	9
1974	548.7	12
1976	650.5	16
1978	695.4	16
1980	1044	16
1982	1002	19
1984	998.8	18
1986	1536.7	16
1988	1789.9	16.7
1990	2220	21.6
1992	2486.6	22.4
1994	2975.23	26

Source: ICBS, National Accounts of Judea and Samaria 1968-1996 (PECDAR, 2007).

In addition to the contribution of the formal construction sector, there is a wide contribution added to the Palestinian economy by the informal sector - unregistered enterprises- but its significance is not yet quantified. According to a study conducted by Massar Association, 2003; 7% of Gross Domestic Income is added (Mustafa, 2008).

The construction sector comprises establishments primarily engaged in the construction of buildings or engineering projects (AME Info, 2007). Housing makes up the bulk of investments. Although spending in this sector has somewhat diminished over the past four years, it is estimated that in 2002 total output in this sector amounted to $300 million (BUYUSA.GOV, 2005). However, in 2004, it appears that the contribution of the construction sector to the GDP has been reduced to 3.3% (PASSIA, 2007). Figure (4) illustrates the economic structure, 2004 estimates (% of GDP) (PASSIA, 2007), (Mustafa, 2008).

Figure (4) the economic structure, 2004 estimates (%GDP)



4.4 Volume of Labor Force Employed in the Construction Sector:

Construction is one of the most important sectors in the assimilation of labor force throughout Palestinian cities and towns. Prior to the Israeli re-occupation of the Palestinian territories on September 28, 2000, table (2) illustrates that construction sector used to employ an average of 22.3% of Palestinian labor force. However, the sector now employs 10.8% of the labor force only; this sector also employs about 30% of laborers indirectly in industries related to the construction sector and other services and productive sectors.

Table (2) *The Labor Force Volume in the Construction sector in 1999-2001*

Economic Activity	**1999**	**2001**
Agriculture, Hunting, Forestry & Fishing	13.2	16.9
Mining, Quarrying & Manufacturing	15.7	12.8
Construction	**22.3**	**10.8**
Commerce, Hotels & Restaurants	16.6	19.4
Transportation, Storage & Communication	5.3	4.9
Services & Other Branches	26.9	35.2

Source: Palestinian Central Bureau of Statistics, Labor Force

4.5 Parties Related to Construction Sector: "stakeholders"

Through a complementary process, several parties contribute to the Construction sector. Such stakeholders are the public and private sectors, universities and institutes, Donor countries, international financing institutions and banking sector.

Stakeholders make available necessary services; provide necessary materials, fund construction projects, and organize the construction contracting profession according to the laws and Regulations enacted by governmental institutions (PCU, 2008).

The construction sector contributes largely to different sectors of investment, such as manufacturing of construction materials. In addition, it provides materials needed for construction, such as stone, marble, brick, floor tiles, etc. Further, the sector is one of the main resources of the commercial sector in Palestine (PCU, 2003).

4.6 Construction Contracting Sector in Palestine

Construction contracting is considered the core for construction sector in Palestine. Palestinian contractors have proved their national role and outstanding ability in construction and reconstruction (PCU, 2008).

4.7 The Construction Contractors in Palestine

PCU defines the contractor as "the individual or company operating in the construction sector and who or which shall be registered and classified at the Palestinian Contractor's Union (PCU, 2008). As per PCU by-law, the contractor is "any natural or legal person who shall have the right to practice construction contracting in accordance with operative laws and regulations" (PCU, 20008). The registered member acquires a classification grade according to the standards specified in the "Instructions of Contractor Classification" issued by the National Classification Committee.
The typical image of the construction contracting profession, whether in the Arab World or in Palestine does not match the role active contractors' play in the building of their societies, Contractors are effective entities involved in all professions subsidiary to the construction sector through a complementary relationship. Further, contractors possess the skills necessary for financial management and project administration. Taking into account that a large number of Palestinian contractors are engineers, contractors' professional experience is also consolidated by Palestinian expatriates. Such status has led to the upgrading of the construction contracting profession in Palestine as regards quality, specialty and professionalism (Adnan and Zohair, 2008).

The number of members classified throughout Palestinian districts has been (599). Members classified in the West Bank have been (379), whereas those classified in the Gaza Strip have been (220), (PCU,2007). According to latest classification made for the year 2009-2010; (381) member have been classified in West Bank.

Contractors shall be classified according to specialty -field of work- as follows (PCU, 2007):

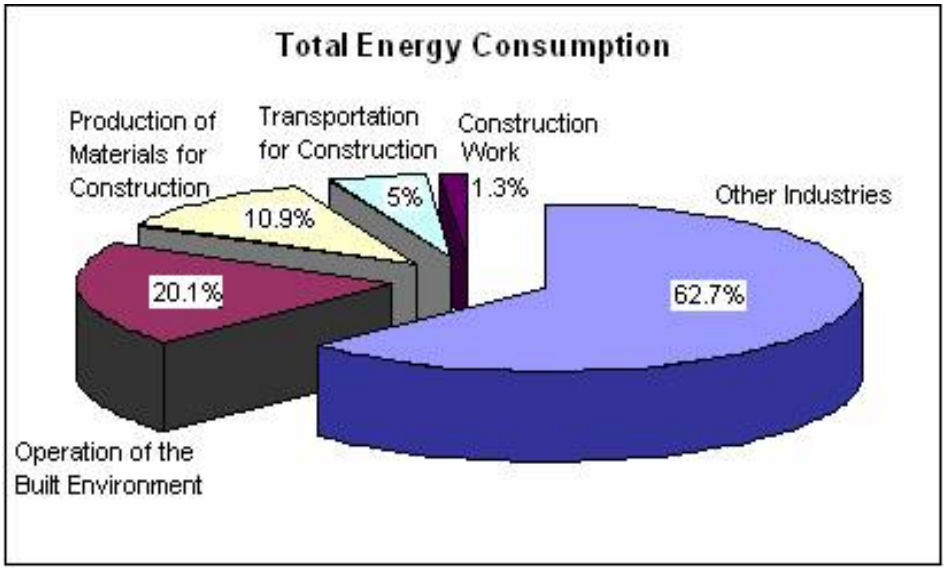
1. Building contractors.
2. Road Construction contractors.
3. Water and sewer contractors.
4. Electro-mechanics contractors.
5. Public works and maintenance contractors.

Barriers to Implementing Sustainable Construction

1. Introduction:

Implementing sustainability is important in the construction industry because it can have a large impact on the environment. Figure (5) illustrates that approximately 37% of the worlds total energy consumption is attributed to construction related activities (Dr. Steve Halls, International Environmental Technology Centre). Construction activities consume approximately half of all the resources humans take from nature. Half of the world's fossil fuel consumption is used to serve buildings. Each year over 420 million tones of resources are used for construction, 6,500 hectares of land is converted from rural to urban, and 90 million tonnes of construction and demolition waste is generated.(Environment Agency, Sustainable Construction: Position Statement), (Rayna, 2005).

Figure 5:



The construction sector is an extremely labour intensive sector and has a very large spectrum of stakeholders / actors; each actor is of critical importance for the completion of the construction chain; if Sustainable Construction is to be mainstreamed. The barriers that stand in the way of mainstreaming must be clarified and prioritized.

2. Barriers to Implementing Sustainable Construction in Palestine:

Numerous barriers preventing sustainable construction in Palestine; most of the contractors attribute these barriers to the political situation while others think that although instability and insecurity play a major role in preventing sustainable growth but they believe that there are many other causes such as:

1. Operational factors: failure to effectively manage markets, finance, employees, prices and customer satisfaction.
2. Management skills, technical ability and leadership, decision making ability, motivation and aspiration values of managers.
3. Accepting change.
4. Financial constraints; lack of financial resources.
5. Limited marketing and human resource management expertise; lack of understanding marketing concept and lack of employees training and development.
6. Limited strategic planning; market segmentation, pricing strategies and environmental analysis.
7. Limited incentives for innovation.
8. Ineffective information technology, lack of system knowledge (Rodney, Christopher, Sherif and Gary).
9. Ignorance of life cycle cost, lack of education and knowledge in sustainable design, and client worries in profitability and pay-back period.

In spite of all the barriers and the hardships that the Palestinian contractors suffer; they still have many advantages and strength. The Palestinians are well known for their persistence, hard work and ambition and this may clarify the fact that most of the Palestinian contractors are highly educated. The contractors invest every opportunity to learn and grow. Granted projects from the donor countries and the international organizations broaden the contractors' horizons by having diverse experiences. Table (3) illustrates the SWOT analysis for the construction sector and the Palestinian contractors:

Table (3)

3. SWOT Analysis for the Construction Sector in Palestine:

Strengths	**Weaknesses**
1. Good experience in dealing with different codes, contracts, specifications 2. Flexibility 3. Contingency plans are always expected and prepared. 4. Working under pressure and for long hours. 5. Supported by International Donors.	1. Lack of capital and internal financing 2. Absence of local currency 3. Subject to currencies fluctuation 4. Shortage of materials 5. High cost of construction 6. Lack of cooperation within supply chain 7. Lack of long term planning 8. Lack of sovereignty on Borders 9. Movement and access in and out of Palestine 10. Segmentations and closures in West Bank. 11. Instability.

Opportunities	Threats
1. Palestine is in need of rebuilding ; the need for all kinds of construction projects; a. Infrastructure b. Residential c. Engineering projects, highways, bridges, airports, etc. … d. Buildings; Hospitals, Schools ,etc e. Industrial engineering	1.Closures 2. Destruction.

4. Scope of the Study:

Uncountable barriers face construction stakeholders in West Bank - Palestine. The researcher decided to focus on the barriers to the implementation process only, and from the contractors' point of view. This study will focus on seven categories and investigate their impact on the implementation of sustainable construction in West Bank – Palestine. These categories are:

4.1. People factor: many contractors pointed that people could be a barrier if they lack awareness; knowledge, skills and resist change. On the other hand a cohesive team with high level of communication and commitment could be a great asset and great motive for implementing sustainable construction.

4.2. Cost factor: the preconception of the high cost of implementing sustainable construction; will be one of the main barriers. other challenges facing the Palestinian contractors causing high cost and limited profit margins is the lack of the national currency; forcing the contractors to deal with different currencies hence the contractors threatened by currency fluctuation risks. Unpredicted expenses may occur according to the unstable political situation the contractors are living and the barriers of access and movements. All these circumstances may cause limit budgets that form one of the main barriers to implementing sustainable construction.

4.3. Time factor: time is a critical issue in construction implementation; delays in handing over may cause high penalties; several reasons may cause delays such as time mismanagement, delays in decision making, delays in consultant approvals and compromising quality of work may occur according to tight schedule, all the above mentioned and other reasons make time a critical issue that needs to be discussed and analyzed.

4.4. Technology factor: technology could be an important support for achieving sustainable construction by saving time, energy and by using the resources efficiently. However, at the same time the high cost of buying technology and the expenses needed to train staff may be considered as a key barrier to implementing sustainable construction.

4.5. Market factor: unprotected market has a negative impact, surpluses of inconvenient materials, lack comprehensive planning, clients and consultant lack interest in implementing sustainable construction.

4.6. Legal aspect "legislation" factor: legal aspect impact caused by Government policies, legislation and planning; lack of strategic planning, lack of regulations protecting customers and national products, all above mentioned reasons could make legal aspects as one of the major barriers to implementing sustainable construction.

4.7. Political situation factor: instability; insecurity and unpredicted conditions are considered as the greatest and the worst barrier that prevents implementing sustainable construction in Palestine.

The above mentioned seven categories; will be the scope of this dissertation and will be discussed and analyzed from the contractors' direct assessment to clarify and prioritize the key barriers to implementing sustainable construction in West Bank – Palestine.

Chapter 3

Research Methodology

1. Introduction:

This chapter reviews the methods and procedures used in the field study and discuses the way the research was developed.

2. Methodology and Data Resources:

The descriptive analytical methodology and field of study were used in this research.

The descriptive methodology was the main used methodology in this study, to describe the main features of collective data in quantitative terms, the researcher was interested to gather the largest possible data; by covering the largest possible percentage of the chosen sample; and the descriptive analytical methodology was the best possible method. Working with quantitative methods provides the researcher with a powerful tool; answers are likely to be precise, measurable and easy to understand.

The covered sample was possible to be reached in different locations and by different means of communication; through emails, faxes and visits. For deeper information and deeper analysis the researcher decided to diversify the followed methodology by preparing a short interview with the four chosen and well known contractors in West Bank – Palestine; to increase the argument and enrich the findings of the study, the purpose of the qualitative data gathered by these interviews; to see how it may fit with the findings of this study.

The data were collected through the following resources:

1. Books and references.
2. Periodicals, papers and master thesis.
3. Palestinian Central Bureau for Statistics (PCBS).
4. Palestinian contractors union (PCU).
5. Internet.
6. Interviews with experts, academics and professionals to enrich the research results.
7. Interviews with contracting firms' managers in West Bank to find out the main barriers to implementing sustainable construction.
8. Questionnaire distribution.

3. Questionnaire Design:

The questionnaire was formatted through the following steps:

a. Primary design was prepared in light of knowledge published in literature
b. External experts and specialists judgment.
c. Pilot study.
d. Modifications according to pilot study.

Likert scale was used for the degree of acceptance starting from strongly agree, agree, neutral, disagree and ending by strongly disagree.

Basic Dimensions of the Questionnaire:

A. **A covering letter** which indicates the objectives of the research and clarifies the meaning of sustainable construction, ending by a commitment from the researcher to participants that their personal information will be top confidential.

B. **General Information Includes the Following Variables**:
   1. Educational level.
   2. Experience.
   3. Field of work "Specialization".
   4. Classification.
   5. Number of Employees.
   6. Location.

C. **Key Barriers to Implementing Sustainable Construction; Divided to Seven Categories:**
   1. People's impact on implementing sustainable construction.
   2. Cost impact on implementing sustainable construction.
   3. Time impact on implementing sustainable construction.
   4. Technology impact on implementing sustainable construction.
   5. Market impact on implementing sustainable construction
   6. Legal aspects "Legislation" impact on implementing sustainable construction.
   7. Political situation impact on implementing sustainable construction.

4. Population and Sample Size:

The population will be the construction companies classified in PCU for the following construction fields - Buildings; "water & sewage"; electromechanical and roads- in West Bank / Palestine. According to PCU in its latest classification in September 2009; number of classified companies in West Bank for all fields and all classifications from first to fifth are 381 companies.
According to the last classification 299 construction companies were classified First, Second and third. These companies will be chosen as the sample of this research.
Table (4) shows the distribution of the classified companies:

Table (4)

Classification Degree	No. of Classified Co.
First	102.00
Second	101.00
Third	96.00
Total	**299.00**

Specifying the size of the sample was not easy for the following reasons:

1. According to PCU by-laws it is allowed for construction companies to attain several classifications for different fields of work according to their qualifications hence one company may be counted several times according to the different classifications and specializations the company may have; table (5) illustrates the distributed classified contractors in W.B. with respect to field of work and location. The researcher decided to calculate each company once according to its highest classification.
2. The researcher decided to distribute **150** copies of the questionnaire to randomly chosen contractors from each field of work but to be distributed **as 50 copies** for each classification. The target respondents were presidents, vice presidents and chief engineers.

Table (5): Distribution of the classified contractors -in West Bank- with respect to fields of work and Location, (PCU, 2009)

Classification →	Building	Water & Sewage	Roads	Sewage Treatment Plant	Electrical	Mechanical	Electro mechanical	Steel Structure	Well Drilling	Total
Jericho			1.00							1.00
Hebron	61.00	47.00	39.00		3.00		4.00			154.00
Jerusalem	6.00	6.00	5.00				1.00			18.00
Bethlehem	41.00	25.00	22.00		1.00		4.00			93.00
Jenin	54.00	33.00	43.00		1.00		3.00		1.00	135.00
Ramallah	64.00	49.00	47.00	2.00	4.00	6.00	16.00	4.00		192.00
Salfeet	15.00	13.00	14.00		1.00					43.00
Tulkarem	18.00	15.00	15.00							48.00
Qalqilya	15.00	9.00	13.00			1.00	1.00			39.00
Nablus	63.00	42.00	34.00		3.00	1.00	6.00			149.00
Total	337.00	239.00	233.00	2.00	13.00	8.00	35.00	4.00	1.00	872.00

Tables (5) above shows increase of 229% in the number of classified contractors from 381 to 872 according to calculation upon Field of work

Figure 6: percentages of the classified contractors with respect to location

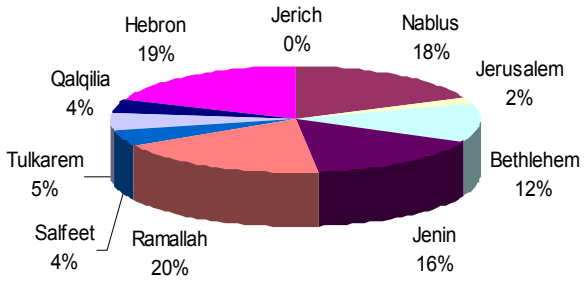
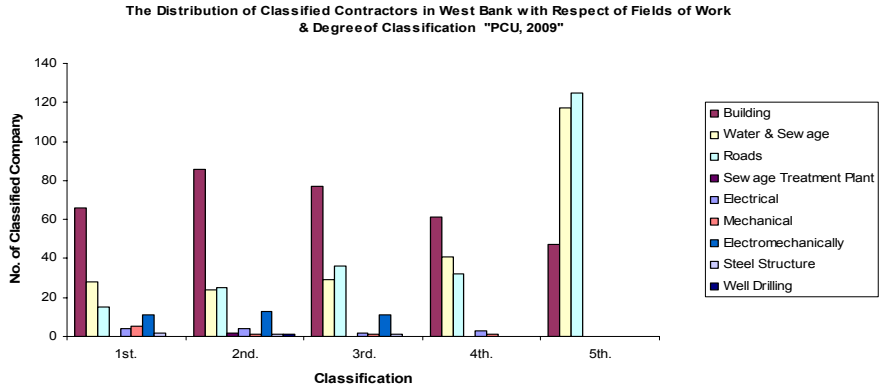


Figure (6) illustrates that the largest percentage of contractors is 20% exists in the city of Ramallah and this may be due to the reality that most granted tenders and largest projects are released in this city. The second and third positions respectively are in the main largest cities in West Bank; Hebron 19% and Nablus 18%. **Table (6)** shows that the great percentages of contracting companies are operating respectively in Building, "water and sewage" and Roads fields; this reflects the need of the reconstruction development processes.

Figure 7:



Distribution of the classified contractors -population – in West Bank / with respect to field of work and degree of classification, (PCU, 2009)

Table (6):

Grade	**1st.**	**2nd.**	**3rd.**	**4th.**	**5th.**
Building	66.00	86.00	77.00	61.00	47.00
Water & Sewage	28.00	24.00	29.00	41.00	117.00
Roads	15.00	25.00	36.00	32.00	125.00
Sewage Treatment Plant		2.00			
Electrical	4.00	4.00	2.00	3.00	
Mechanical	5.00	1.00	1.00	1.00	
Electromechanical	11.00	13.00	11.00		
Steel Structure	2.00	1.00	1.00		
Well Drilling		1.00			
Total	**131.00**	**157.00**	**157.00**	**138.00**	**289.00**

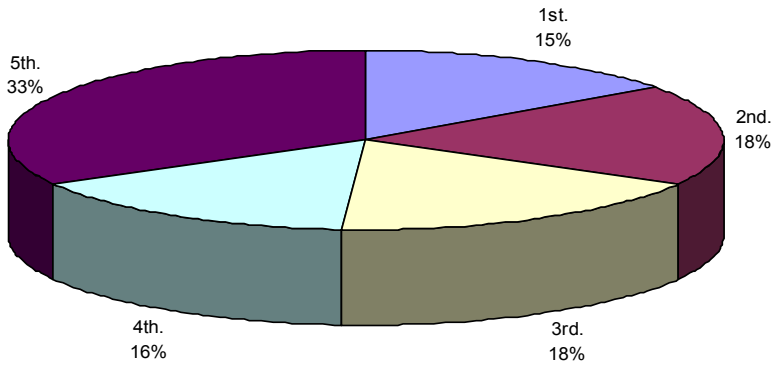
Source: Palestinian contractor's union database, in September, 2009.

Figure (7) illustrates that the highest classifications are for the benefit of the contractors operating in buildings. This reflects the degree of competition between the contractors in this field. The second position is for the contractors operating in water & sewage. A comparison between contractors operating in field of "water & sewage" and the contractors operating in roads; the results will be that the total number of contractors classified first second and third; are very close in both fields but the classification will be for the benefit of the contractors specialized in water & sewage.

Most classifications for the contractors operating in Roads are between the fourth and the fifth degree which reflects that the degree of competition between contractors is limited for certain levels but this field could be considered as an open opportunity for the ambitious contractors.

Figure (8) shows that only 15% of the classified contractors are classified as first in the different fields of work. 18% are classified as second class which will create a motive for these contractors to upgrade their qualifications in order to reach the first class. The competition between the different classifications is a healthy attitude that may facilitate the researcher's mission in clarifying the importance of achieving sustainable construction in Palestine by continuous improvements in performance.

Figure 8: Classified contractors with respect to degree of classification (PCU, 2009)



5. Limitation & location:

The research was carried out in West Bank only and did not include Gaza strip due to the political situation. The cities covered by this research were divided to three regions:

1. South; Hebron and Bethlehem.
2. Middle region; Ramallah, Jerusalem and Jericho.
3. North; Nablus, Jenin, Tulkarem, Qalqilya and Salfeet.

6. Pilot Study:

A pilot study questionnaire was launched to test the main barriers to implementing sustainable construction and to provide information for the development of the main research questionnaire. Pilot samples of 10 contractors were chosen and the results showed that all questions are clear, accurate and well understood.

7. Questionnaire Delivery and Recovery:

1. A list of contracting companies registered in the Palestinian Contractors Union (PCU) on September 2009 in West Bank was obtained from PCU; this list includes companies' names, addresses, fields of work and classifications.

2. 150 copies of the questionnaire were distributed to classified construction companies in the main cities in West Bank. Taking into account the classification degree and field of work. The contractors were reached through: telephone, fax, emails and visits.
3. Response rate was approximately (70.67%) table (7) illustrates that 106 questionnaires were filled, collected and recovered.

Table (7)

Questionnaire Response			
	Levels	Frequency	Percent
1	First	49.00	46.20
2	Second	38.00	35.80
3	Third	19.00	17.90
Total		106.00	100.00

8. Statistical Tools Used in the Research:

- Alpha (Cronbach).
- Frequencies, percentages, means and standard deviation.
- One way ANOVA.
- Post Hoc Test .

9. Questionnaire Validity:

(The research study began with a review of relevant materials from textbooks, professional journals, conferences papers, research reports, and internet information. The objective of the literature review is to develop a framework for the research study and to prepare for the structured interviews and questionnaire survey. The identified barriers have been verified through a series of face- to- face interviews with a number of selected experts in construction project management and contractors. Hence, questionnaire validity was verified in many ways.

10.Content Validity:

A preliminary questionnaire was drafted and evaluated by many experts and academics.

A test was made to check the questionnaire content validity and to assure that the sentences are clear and precise; accordingly the draft version was modified.

11.Questionnaire Reliability:

Reliability is tested by using Cronbach Alpha factor; - one of the most popular reliability statistics in use today (Cronbach, 1951). Cronbach's alpha determines the internal consistency or average correlation of items in a survey instrument to gauge its reliability: table (8) illustrates that the value of Cronbach Alpha factor for the whole questionnaire- 65 questions - was 0.70, that means all items are reliable according to the range of Cronbach's coefficient alpha; value between 0.0 and + 1.0 is reliable (Journal of Extension). Therefore, it can be said that the researcher proved that the questionnaire was reliable.

Cronbach Alpha Test: **Table 8:**

Categories	Factor
Total Value for all categories	0.70

12. Interviews:

A short questionnaire was furnished for special interviews; three of the interviews were with managers of three leading companies and the last interview was made with the president of the Palestinian Contractors Union in West Bank – Palestine.

The purpose of these interviews was to check the reliability of the results of the research.

Chapter 4

Data Analysis and Discussion

1. Introduction:

This chapter aims to analyze the empirical data which were collected through the questionnaire distribution. The chapter is divided into three sections:

1. Sample characteristics analysis.
2. Main Categories analysis and discussion.
3. Hypotheses testing.

2. Sample Characteristics Analysis:

2.1. General Information:

2.2. Distribution of the sample with respect to education:

	Education						**Table (9)**
			Levels	Frequency	%	Valid %	Cumulative %
	Valid	1	High school or below	20.00	18.90	18.90	18.90
		2	Diploma	11.00	10.40	10.40	29.20
		3	Bsc.	65.00	61.30	61.30	90.60
		4	Post Graduate	10.00	9.40	9.40	100.00
	Total			106.00	100.00	100.00	

Table (9) illustrates that 61.3% of the contractors in West Bank are highly educated which emphasizes what is known about the Palestinian contractors that most of them are engineers (PCU), and this indicates their awareness of the importance of education and improvement. However, on the other hand only 9.40% are post graduates which indicate that still there is a need to enhance educational ambition.

2.3. **Distribution of the sample with respect to experience:**

	Experience						**Table (10)**
			Levels	Frequency	Percent	Valid Percent	Cumulative Percent
	Valid	1	1-5	17.00	16.00	16.00	16.00
		2	6-10	20.00	18.90	18.90	34.90
		3	11-15	23.00	21.70	21.70	56.60
		4	Above 15	46.00	43.40	43.40	100.00
	Total			106.00	100.00	100.00	

Table (10) illustrates that most of the contractors have experience above 15 years; which indicates their persistence and their capabilities of surviving despite of all instable and insecure situation they are living.

2.4. Distribution of the sample with respect to field of work:

	Field of Work						Table(11)
			Levels	Frequency	Percent	Valid Percent	Cumulative Percent
	Valid	1	Buildings	34.00	32.10	32.10	32.10
		2	Water & sewage	2.00	1.90	1.90	34.00
		3	Electromechanical	7.00	6.60	6.60	40.60
		4	Roads	3.00	2.80	2.80	43.40
		5	More than one	60.00	56.60	56.60	100.00
				106.00	100.00	100.00	

Table (11) illustrates 56.6% of the respondents have more than one specialization "field of work" which indicates that the contractors are working hard to be qualified in different fields of work to expand their opportunities and guarantee their market share. The second place was for building with 32.1% that reflects the true statistics of the contractors operating in this domain by having the highest percentages with respect to classification in comparison with other fields. The third and fourth places are for electromechanical 6.6% and roads 2.8% respectively and finally water & sewage took 1.9% only.

2.5. Distribution of the sample with respect to classification:

	Classification						Table (12)
			Levels	Frequency	Percent	Valid Percent	Cumulative Percent
	Valid	1	First	49.00	46.20	46.20	46.20
		2	Second	38.00	35.80	35.80	82.10
		3	Third	19.00	17.90	17.90	100.00
	Total			106.00	100.00	100.00	

Table (12) illustrates that the highest percentage response is from first class which reflects their interest in the subject of the study or simply it may reflect their attitude toward every opportunity for growth. The lowest percentage of the response was for the third grade.

2.6. Distribution of the sample with respect to number of employees:

	Number of Employees						Table (13)
				Frequency	Percent	Valid Percent	Cumulative Percent
	Valid	1	1-10	45.00	42.50	42.50	42.50
		2	11-20	38.00	35.80	35.80	78.30
		3	21-30	10.00	9.40	9.40	87.70
		4	Above 30	13.00	12.30	12.30	100.00
				106.00	100.00	100.00	

Table (13) illustrates that the highest percentage of the response to the questionnaire 42.50% comes from the contractors with the lowest number of employees 1-10.

2.7. Distribution of the sample with respect to location:

	Location						Table (14)
				Frequency	Percent	Valid Percent	Cumulative Percent
	Valid	1	South	24.00	22.60	22.60	22.60
		2	Middle	49.00	46.20	46.20	68.90
		3	North	33.00	31.10	31.10	100.00
		Total		106.00	100.00	100.00	

Table (14) illustrates that the highest response rate came from the middle region 46.20% which reflects that the highest rate of contractors' distribution is in the middle region.

3. Main Categories Analysis and Discussion:

To analyze the answers for the questions, table (15) illustrates the arithmetic mean and standard deviations of the contractors' responses were extracted with the adoption of the following standard:

1. High degree: If the arithmetic mean of a paragraph, domain or the highest total degree is more than (3) plus the value of the standard deviation of the standard of a paragraph or the domain or the total degree.
2. Average degree: if the arithmetic mean of a paragraph or a domain or total degree is confined to (3 ± standard deviation).
3. Low-degree: If the arithmetic mean of a paragraph or the domain or the total degree is less than (3) minus the value of the standard deviation of the paragraph or a domain or the total degree.

Arithmetic means and standard deviations reflect the main barriers to implementing sustainable construction as seen by contractors to the paragraphs / categories of the study.

3.1. Descriptive Analysis Total **Table (15)**

Category No.	Rank	**Category**	**Mean**	**Standard of Deviation**	**Degree**
1	5	People	3.69160	0.43920	High
2	3	Cost	3.90630	0.31549	High
3	7	Time	3.55660	0.36400	High
4	4	Technology	3.71700	0.54291	High
5	6	Market	3.65450	0.39095	High
6	2	Legal aspect "legislations"	4.10500	0.49224	High
7	1	Political Situation	4.27520	0.50082	High
		Total	**3.70790**	**0.24226**	**High**

Table (15) shows the arithmetic means and standard deviations for the seven categories.
The table illustrates that contractors **highly agree** that all these categories were the main barriers to implement sustainable construction; the arithmetic mean for the seven Categories were 3.70790.
According to the contractors responses political situation is the highest rated and first barrier, legal and legislation is the second, cost is the third, technology is the fourth, people are in the fifth position, market is in the sixth position and finally time is in the seventh**.**

For deeper analysis and more discussions Table (16) illustrates The Top Ten rated questions; according to the contractors responses. The following items are considered as the highest barriers to implementing sustainable construction:

3.2. ***Top Ten Rated Questions***

Table (16)

S. No.	Category	No	Question	Mean	Std. Deviation
01	Politics	Q60	Instability , insecurity	4.50000	0.77152
02	Politics	Q61	Closures	4.48110	0.69325
03	Cost	Q25	Access & movement on borders & ports yield unpredicted cost	4.47170	0.71989
04	Market	Q44	No comprehensive planning for the needed Projects	4.42450	0.64658
05	Cost	Q22	Dealing with different currencies under the same contract - revenues in one currency & expenditures in other – affect deeply contractors margins.	4.40570	0.81391
06	Cost	Q23	Fluctuation of contracts' currency - conversion rates – harm deeply contractors' cost stability	4.34910	0.99563
07	Cost	Q19	Cash flow mismanagement affects implementation quality.	4.33020	0.89146
08	Regulation	Q52	Lack of strategic planning by authorities	4.33020	0.72666
09	Politics	Q62	Unpredicted conditions	4.30190	0.69241
10	Time	Q33	Delays in consultant approvals	4.27360	0.86776

Table (16) shows that contractors highly agree that instability and closures – in other words occupation - are the main barriers to implementing sustainable construction Looking at the rest of the listed items; many could be attributed to the same reason such as unpredicted conditions in Palestine and the related unpredicted costs that harm deeply contractors' safety margins.

Currency is another threatening issue, it could be considered as a gamble game for contractors; the absence of the national currency forced the clients and investors to release their projects in different currencies therefore; dealing with US. Dollars ($), European currency (€), Jordanian Dinar (JD), New Israeli sheqels NIS, etc. is a normal condition in Palestine and this will put the contractors in the middle of the currency fluctuation war. Accordingly the Palestinian contractors are forced to deal with different currencies even under one project; most of the expenditures are in new Israeli sheqels (NIS), some of the subcontracts agreements are in other currencies such as JD, revenues most of the time are in US dollars unless the project is financed by a donor country or international organizations then their currency will prevail.

Despite of the prevailing situation; many barriers could be attributed to other causes such as:

1. Lack of strategic planning by authorities: this could be attributed to the short term political goals or to the priorities set by the authorities.
2. Lack of comprehensive planning for the needed projects; this reflects the dependency on the granted projects which may be specified by the donor countries without taking into account the grantee needs, in addition to the reality that the proposals of the projects are submitted with out proper cooperation. According to the World Bank report;-"Four Years-Intifada, Closures and Palestinian Economic Crisis"- the prioritizing of projects according to a set of transparent criteria is a key. The selection process could focus on sectoral and spatial needs in relation to implementation and absorption capacities, instead of donor preferences (2004).
3. Cash flow mismanagement (Adnan, Khalid and Sherif), affects implementation quality.
4. Delays in consultant approvals;

   Items 3 and 4 could be attributed to:

   a. Relation between contractors and consultants.
   b. Delays in decision making.
   c. Unawareness of the importance of cooperation between all responsible parties; - the contractors, consultants, clients, suppliers - .
   d. Unawareness of insufficient liquidity and its impact on the project, but it is worth mentioning that some delays of cash liquidity is related to political issues such as delays in receiving remittances from abroad according to the binding complicated procedures for money circulations.

Table (17) illustrates the minimal rated five questions that are less important and not considered as a barrier to implement sustainable construction in West Bank - Palestine according to the contractors' responses:

3.3. Minimal rated questions **Table (17)**

S. No.	Category	Q. No	Question	Mean	Std. Deviation
01	Time	Q37	Training consumes time	2.90570	1.28381
02	Time	Q31	No relation between methods of implementation and sustainable construction	2.89620	1.07729
03	Market	Q51	Unique characteristics of each project ; prevent sustainable construction	2.85850	1.06403
04	Cost	Q16	Fierce competition ; enhance sustainable construction implementation	2.75470	1.18572
05	People	Q13	Sustainable construction will be implemented by increasing resources to accelerate work.	2.17920	1.07612

The Contractors' explanations for the low rated items are:

1. Training is considered as a good investment especially on the long run.
2. Contractors believe that there is a strong relation between methods of implementation and sustainable construction, the more modern methods used the more sustainability will be achieved;

and that could be attained by the efficient use of resources and assuring the best quality that could be realized.

3. Contractors believe that working on different projects with different specifications will expand their horizons and therefore their ability will be more competitive and more sustainable.
4. Contractors believe in decent competition and they do think that the fierce competition will harm the quality and the standards of construction.
5. According to the contractors it is not a matter of increasing resources to attain sustainable construction it's a matter of using the appropriate needed resources; emphasizing on the quality and skills.

4. Hypotheses Analysis: Hypotheses were tested to determine the differences between groups of the main barriers to implementing sustainable construction by using One-Way ANOVA test:

4.1. The First Hypothesis: There is no statistically significant difference at the level of significance ($\alpha \leq 0.05$) between the averages of contractors' assessments of the main barriers to implementing sustainable construction in West Bank - Palestine due to educational level of the contractor, Table (18) shows that the value of Significance is greater than 0.05 for the main barriers to implementing sustainable construction in WB – Palestine; meaning that No effect could be attributed to educational level of contractors on The main barriers to implementing sustainable construction in West Bank - Palestine .

ANOVA One Way Test for the First Hypothesis : Educational level **Table (18) :**

			Sum of Squares	DF	Mean Square	F	Sig.
Total		Between Groups	0.108	3.000	0.036	0.607	0.612
		Within Groups	6.054	102.000	0.059		
		Total	6.162	105.000			
Tot.1	People	Between Groups	0.085	3.000	0.028	0.143	0.934
		Within Groups	20.169	102.000	0.198		
		Total	20.254	105.000			
Tot.2	Cost	Between Groups	0.233	3.000	0.078	0.776	0.510
		Within Groups	10.218	102.000	0.100		
		Total	10.451	105.000			
Tot.3	Time	Between Groups	0.228	3.000	0.076	0.567	0.638
		Within Groups	13.684	102.000	0.134		
		Total	13.912	105.000			
Tot.4	Technology	Between Groups	1.196	3.000	0.399	1.367	0.257
		Within Groups	29.753	102.000	0.292		
		Total	30.949	105.000			
Tot.5	Market	Between Groups	0.067	3.000	0.022	0.142	0.935
		Within Groups	15.982	102.000	0.157		
		Total	16.048	105.000			
Tot.6	Legal aspects	Between Groups	0.463	3.000	0.154	0.631	0.597
		Within Groups	24.978	102.000	0.245		
		Total	25.442	105.000			
Tot.7	Politics	Between Groups	0.777	3.000	0.259	1.033	0.381
		Within Groups	25.559	102.000	0.251		
		Total	26.336	105.000			

4.2. The second Hypothesis: No statistically significant difference at the level of significance ($\alpha \leq 0.05$) between the averages of contractors' assessments of the main barriers to implementing sustainable construction in West Bank - Palestine due to experience level of the contractor, Table (19) shows that the value of Significance is greater than 0.05 for the seven categories: people, cost, time, technology, and market, legal aspects "legislations" and Political situation, That means no effect could be attributed to Experience level of contractors on The main barriers to implementing sustainable construction at the construction companies in West Bank.

ANOVA One Way Test for the Second Hypothesis : Experience **Table (19):**

		Sum of Squares	DF	Mean Square	F	Sig.
Total	Between Groups	0.296	3.00	0.099	1.716	0.168
	Within Groups	5.866	102.00	0.058		
	Total	6.162	105.00			
Tot.1	Between Groups	0.473	3.00	0.158	0.813	0.490
	Within Groups	19.781	102.00	0.194		
	Total	20.254	105.00			
Tot.2	Between Groups	0.277	3.00	0.092	0.926	0.431
	Within Groups	10.174	102.00	0.100		
	Total	10.451	105.00			
Tot.3	Between Groups	0.225	3.00	0.075	0.558	0.644
	Within Groups	13.688	102.00	0.134		
	Total	13.912	105.00			
Tot.4	Between Groups	0.7	3.00	0.233	0.787	0.504
	Within Groups	30.249	102.00	0.297		
	Total	30.949	105.00			
	Between Groups	0.164	3.00	0.055	0.350	0.789
	Within Groups	15.885	102.00	0.156		
	Total	16.048	105.00			
Tot.6	Between Groups	0.863	3.00	0.288	1.194	0.316
	Tot.5	24.579	102.00	0.241		
	Total	25.442	105.00			
Tot.7	Between Groups	1.792	3.00	0.597	2.483	0.065
	Within Groups	24.544	102.00	0.241		
	Total	26.336	105.00			

4.3. The third Hypothesis: No statistically significant difference at the level of significance ($\alpha \leq 0.05$) between the averages of contractors' assessments of the main barriers to implementing sustainable construction in West Bank - Palestine due to specialization level of the contractor, Table (20) shows that the value of Significance is greater than 0.05 for the seven categories: people, cost, time, technology, and market, legal aspects "legislation" and Political situation, that means no effect could be attributed to Specialization of contractors on the main barriers of implementing sustainable construction at the construction companies in West Bank.

ANOVA One Way Test for the Third Hypothesis : Specialization: **Table (20):**

		Sum of Squares	DF.	Mean Square	F.	Sig.
Total	Between Groups	0.349	4.00	0.087	1.514	0.204
	Within Groups	5.814	101.00	0.058		
	Total	6.162	105.00			
Tot.1	Between Groups	1.49	4.00	0.373	2.005	0.099
	Within Groups	18.764	101.00	0.186		
	Total	20.254	105.00			
Tot.2	Between Groups	0.816	4.00	0.204	2.137	0.082
	Within Groups	9.636	101.00	0.095		
	Total	10.451	105.00			
Tot.3	Between Groups	0.884	4.00	0.221	1.713	0.153
	Within Groups	13.028	101.00	0.129		
	Total	13.912	105.00			
Tot.4	Between Groups	1.356	4.00	0.339	1.157	0.334
	Within Groups	29.593	101.00	0.293		
	Total	30.949	105.00			
Tot.5	Between Groups	0.736	4.00	0.184	1.213	0.310
	Within Groups	15.313	101.00	0.152		
	Total	16.048	105.00			
Tot.6	Between Groups	1.398	4.00	0.350	1.468	0.217
	Within Groups	24.044	101.00	0.238		
	Total	25.442	105.00			
Tot.7	Between Groups	2.107	4.00	0.527	2.196	0.075
	Within Groups	24.229	101.00	0.240		
	Total	26.336	105.00			

4.4. The fourth Hypothesis: No statistically significant difference at the level of significance ($\alpha \leq 0.05$) between the averages of contractors' assessments of the main barriers to implementing sustainable construction in West Bank - Palestine due to classification level of the contractor, Table (21) shows that the value of Significance is greater than 0.05 for the main barriers which means no effect could be attributed to Classification of contractors on The main barriers of implementing sustainable construction at the construction companies in West Bank .

ANOVA One Way Test for the Fourth Hypotheses : Classification: Table (21):

		Sum of Squares	DF.	Mean Square	F	Sig.
Total	Between Groups	0.012	2.000	0.006	0.102	0.903
	Within Groups	6.150	103.000	0.060		
	Total	6.162	105.000			
Tot.1	Between Groups	0.266	2.000	0.133	0.685	0.506
	Within Groups	19.988	103.000	0.194		
	Total	20.254	105.000			
Tot.2	Between Groups	0.215	2.000	0.107	1.080	0.343
	Within Groups	10.237	103.000	0.099		
	Total	10.451	105.000			
Tot.3	Between Groups	0.208	2.000	0.104	0.782	0.460
	Within Groups	13.704	103.000	0.133		
	Total	13.912	105.000			
Tot.4	Between Groups	0.292	2.000	0.146	0.491	0.614
	Within Groups	30.657	103.000	0.298		
	Total	30.949	105.000			
Tot.5	Between Groups	0.170	2.000	0.085	0.551	0.578
	Within Groups	15.878	103.000	0.154		
	Total	16.048	105.000			
Tot.6	Between Groups	0.019	2.000	0.009	0.038	0.963
	Within Groups	25.423	103.000	0.247		
	Total	25.442	105.000			
Tot.7	Between Groups	1.254	2.000	0.627	2.575	0.081
	Within Groups	25.082	103.000	0.244		
	Total	26.336	105.000			

The explanation of the four hypothesis' testing results; that no effect could be attributed to the educational level, experience, specialization and classifications of the contractors on the main barriers of implementing sustainable construction in WB – Palestine, could be explained as follows:

The expected results in the normal situation are; the more the contractors are highly educated and the more they broaden their horizons by having different experiences and ambitions for high classifications the more it is expected that their response and evaluations will be different than the other contractors. The results did not show that the main barriers were related to technical weaknesses. Hence the sequence of the main barriers according to this study results are:

a. Political situation.
b. Legal aspects and legislation.
c. Cost.
d. Technology.
e. People.
f. Market.
g. Time.

This sequence reflects the fact that instability and insecurity the Palestinians are living are the main barriers that prevent implementing sustainable construction and the impact of these barriers were clear in this research on the other aspects through closures and through access and movements which was clearly reflected on cost and time too. According to the World Bank; the most binding constraints on economic activity in West Bank and Gaza (WBG) are the uncertainty and extra cost of doing business because of the difficulty of access- not only to external markets but also to local markets-; resulting from the Israeli occupation. The latter includes special measures affecting imports into WBG: back to back system, the system of fixed and mobile checkpoints in the WB and closures (including the separation wall), (World Bank, 2006). Palestinian trade center (Pal Trade) emphasized - in the monthly monitoring report / West Bank Crossing Bi, (October/ November 2009) – on the complicated procedures that Palestinians are forced to follow for transporting goods; yielding extra cost and damages (Pal Trade, 2009).Closure and curfew, restricting movement of both goods and people, have led to a worsening humanitarian situation and the Palestinian economy has experienced an unprecedented decline (Commission of European Communities).

The Palestinian contractors didn't consider using technology as a barrier or training; on the contrary; they consider it as inevitable investment. The contractors believe that having more than one field of work and a higher classification will increase their market share and help them survive in such conditions of life. This explanation was supported by the result of this study that shows %61.3 of the contractors are highly educated and that %56.6 having more than one field of specialization.

In other words the explanation for the four hypothesis' results is that the main problem the Palestinian contractors are suffering from political situation; the over whelming effect; impacts all.

4.5. The fifth Hypothesis: No statistically significant difference at the level of significance ($\alpha \leq 0.05$) between the averages of contractors assessments of the main barriers to implementing sustainable construction in West Bank - Palestine due to number of employees of the contractor. Table (22) illustrate that there is no statistically significant differences between the averages grade in the contractors evaluation to the main barriers implementing sustainable construction in WB - Palestine for the total degree and for all categories except category"2", and category "4".

ANOVA One Way Test for the Fifth Hypothesis : No of Employees Table (22):

		Sum of Squares	DF.	Mean Square	F	Sig.
Total	Between Groups	0.396	3.000	0.132	2.337	0.078
	Within Groups	5.766	102.000	0.057		
	Total	6.162	105.000			
Tot.1	Between Groups	0.043	3.000	0.014	0.073	0.974
	Within Groups	20.211	102.000	0.198		
	Total	20.254	105.000			
Tot.2	Between Groups	1.018	3.000	0.339	3.669	0.015*
	Within Groups	9.433	102.000	0.092		
	Total	10.451	105.000			
Tot.3	Between Groups	0.232	3.000	0.077	0.578	0.631
	Within Groups	13.680	102.000	0.134		
	Total	13.912	105.000			
Tot.4	Between Groups	3.080	3.000	1.027	3.757	0.013*
	Within Groups	27.870	102.000	0.273		
	Total	30.949	105.000			
Tot.5	Between Groups	0.697	3.000	0.232	1.545	0.208
	Within Groups	15.351	102.000	0.150		
	Total	16.048	105.000			
Tot.6	Between Groups	0.398	3.000	0.133	0.540	0.656
	Within Groups	25.044	102.000	0.246		
	Total	25.442	105.000			
Tot.7	Between Groups	0.527	3.000	0.176	0.694	0.558
	Within Groups	25.809	102.000	0.253		
	Total	26.336	105.000			

To know the benefit of the difference in this area (LSD) test was made:

Results of the test (LSD) analysis clarified in table (22.1) to determine the benefit of the difference in the estimates of study sample for category 2 and category 4 - to the extent of the main barriers implementing sustainable construction in WB – Palestine.

Post Hoc Tests **Table (22.1):**

Dependent Variable	(I)No. Employees		(J)No. Employees		Mean Difference (I-J)	Sig.
Tot.2	1	1-10	2	11-20	-.15366-*	0.024
			3	21-30	-.13975-	0.192
			4	< 30	-.28480-*	0.004
	2	11-20	1	1-10	.15366*	0.024
			3	21-30	0.01391	0.898
			4	< 30	-.13115-	0.183
	3	21-30	1	1-10	.13975	0.192
			2	11-20	-.01391-	0.898
			4	< 30	-.14505-	0.259
	4	more than 30	1	1-10	.28480*	0.004
			2	11-20	0.13115	0.183
			3	21-30	0.14505	0.259
Tot.4	1	1-10	2		-.28222-*	0.016
			3		0.25778	0.161
			4		-.18222-	0.271
	2	11-20	1		.28222*	0.016
			3		.54000*	0.004
			4		0.1	0.553
	3	21-30	1		-.25778-	0.161
			2		-.54000-*	0.004
			4		-.44000-*	0.048
	4	more than 30	1		0.18222	0.271
			2		-.10000-	0.553
			3		.44000*	0.048

Category 2 – Cost:

The above table shows that there are statistically significant differences between category (1-10) and category (11-20) and was in favor of category (11-20), and the category (1-10) and category (over 30) and was in favor of category (more than 30).

The explanation of this result is: the higher the number of employees the contractor has; the higher the possibility the cost becomes a barrier for the implementation of sustainable construction. Therefore the efficiency in using the human resources is the right method in implementation as it appears from the contractors' responses that there is no relation between increasing numbers of human resources and the implementation of sustainable construction; on the contrary the contractors emphasize on quality and efficiency in using the resources. Another reason behind the limited direct employed people in construction companies is that the common practice is to use subcontractors to execute specific operation in the project. The main reasons behind using subcontractors were reducing overhead costs, reducing work pressure on the main contractors, maximizing profits (Adnan and Zohair).

Category 4 – Technology:

The above table shows that statistically significant differences between category (1-10) and category (11-20) and was in favor of category (11-20), and category (11-20) and category (21-30) and was in favor of a class (11-20), and the category (21-30) and category (over 30) and was in favor of the category (over 30).

The explanation of this result is: the contractors that employ 1-10 employees; considered using technology is not a barrier as much as the contractors who employ higher 11-20 employees, this could be explained as follows:

The less the number of hired employees the less the technology seems to be a barrier to implementing sustainable construction which could be explained that the cost of having technology will be less expensive hence it gives an impression that the contractor is relying on technology and on the efficiency in using resources . However, on the other hand the comparison between category 11-20 and category 21-30 was in favor of category 11-20 and the comparison between 21-30 and the category over 30 was in favor of over 30. This result emphasizes that the more the contractor is using human resources the more the contractor is neglecting technology; this may refer to the high cost the contractor assumes by using technology. If we look deeper in the conflict taking place between category 11-20 and category 21-30 we can explain the result as follows:

1) 42.5% of the contractors hire 1-10 employees only and 35.8% of the contractors hire 11-20 which means that the Palestinian contractors hire the needed resources and emphasize on using modern methods of implementation by using technology. So; 78.5% of the contractors believe in using technology for efficiency, however; they are aware of the high cost of technology if it is needed to be obtained for large numbers of employees, or the high cost it could be if this technology is not used in an efficient way to save time; efforts and resources. The limited number of hired employees refers to the Palestinian contractors' policy in relying on the subcontracts and indirect employment. More than 90% of construction works are performed by subcontracts (Adnan and Zohair).
2) The contractors who hire more than 20 persons obviously rely on increasing human resources more than relying on technology and they consider technology as a barrier to implement sustainable construction hence this result could be explained as follows:

a. These contractors believe in traditional methods of implementation, and they may assume that having technology will be more expensive than increasing human resources.
b. These contractors form only 21.7% from the respondent contractors as it appears in the results of this study, this may be attributed to the contractors unawareness of the importance of technology in saving money; efforts and time on the long run. This low percentage of contractors can not be representative of the Palestinian contractors.
c. Another possibility that those contractors who have more than 20 employees; counted the subcontractors as part of their resources , in this case technology could not be considered as a problem specially most contracts made with subcontractors ; cost include equipments.

4.6. The sixth Hypothesis: No statistically significant difference at the level of significance ($\alpha \leq 0.05$) between the averages of contractors' assessments of the main barriers to implementing sustainable construction in West Bank - Palestine due to the location of the contractor. Table (23) illustrates that there is no statistically significant differences between the averages grade in the contractors' evaluation to the main barriers to implementing sustainable construction in WB - Palestine for the total degree and for all categories except category"3".

ANOVA One Way Test for the Sixth Hypothesis: Location Table (23):

		Sum of Squares	DF	Mean Square	F	Sig.
Total	Between Groups	0.171	2.00	0.085	1.467	0.235
	Within Groups	5.992	103.00	0.058		
	Total	6.162	105.00			
Tot.1	Between Groups	0.171	2.00	0.086	0.439	0.646
	Within Groups	20.083	103.00	0.195		
	Total	20.254	105.00			
Tot.2	Between Groups	0.212	2.00	0.106	1.064	0.349
	Within Groups	10.240	103.00	0.099		
	Total	10.451	105.00			
Tot.3	Between Groups	0.900	2.00	0.450	3.563	0.032*
	Within Groups	13.012	103.00	0.126		
	Total	13.912	105.00			
Tot.4	Between Groups	0.922	2.00	0.461	1.581	0.211
	Within Groups	30.028	103.00	0.292		
	Total	30.949	105.00			
Tot.5	Between Groups	0.179	2.00	0.089	0.579	0.562
	Within Groups	15.870	103.00	0.154		
	Total	16.048	105.00			
Tot.6	Between Groups	0.945	2.00	0.473	1.987	0.142
	Within Groups	24.497	103.00	0.238		
	Total	25.442	105.00			
Tot.7	Between Groups	0.169	2.00	0.084	0.332	0.718
	Within Groups	26.167	103.00	0.254		
	Total	26.336	105.00			

To know the benefit of the difference in this area (LSD) test was made:

Results of the test (LSD) analysis clarified in table (23.1) to determine the benefit of the difference in the estimates of study sample for category 3 - to the extent of the main barriers implementing sustainable construction in WB – Palestine.

Post Hoc Tests **Table (23.1)**

(I) Location	(J) Location	Mean Difference (I-J)	Sig.
1	2	-.06308-	0.478
	3	-.23416-*	0.016
2	1	0.06308	0.478
	3	-.17108-*	0.035
3	1	.23416*	0.016
	2	.17108*	0.035

The table above shows that there are statistically significant differences between category (south area) and category (middle area) was in favor of category south area and between category (south area) and category (north area) and was in favor of category (south area).

The explanation of this result is that the contractors living in south area consider the barriers to implementing sustainable construction increase due to location and this could be explained as follows:

1. Ramallah is becoming the economic capital of Palestine (Tamara, 2008, Arabia Business) accordingly; most of the large scale tenders are released in the middle area of West Bank – Palestine.
2. The low percentage of the grants and investments distributed in south area compared with the middle and north areas.
3. The results of this research showed that 46% of the contractors concentrated in the middle area of WB. Due to the reality that vital projects are concentrated in that area and to avoid the impediments of movement and access most of the contractors move from different locations in WB to Ramallah, according to the World Bank an increase in transportation cost from Ramallah to Bethlehem in the year 2005 compared with year 2000 was 195% table (24), (World Bank, 2006).

Transportation cost increase **Table (24)**

From Ramallah To:	Pre-September 2000 Time	Distance	Cost	December 2005 Alternative Route # 1 Time	Distance	Cost	% change in cost over pre-Sept. 2000	December 2005 Alternative Route #2 Time	Distance	Cost	% change in cost over pre-Sept. 2000
Bethlehem	35	25	29.1	90	80	86.0	195%	210	105	130.4	348%
Nablus	60	50	54.4	90	60	68.6	26%	180	90	111.8	105%
Jenin	90	90	94.6	210	140	160.5	70%	420	200	252.2	167%

ource: World Bank staff calculations.

5. Interviews analysis: the results of the four short interviews were as follows:

1. The four contractors have been in this field for more than 20 years.
2. Awareness of sustainable construction was formed through self study, experience and seminars.
3. The importance of the three attributes of sustainable construction were prioritized upon contractors point of view:
    a. The first contractor chose environment as the most important attribute then economy and social as the final.
    b. Two of the contractors agreed that the three attributes of sustainable construction are equally important
    c. The last contractor chose economy as the most important attribute for sustainable construction
4. All contractors insist on the importance of political situation and its impact on implementing sustainable construction. They think that people will come in second position and technology in the third position.
5. All contractors agreed that the government should exercise more influence to encourage the implementation of sustainable construction and they believe that the role contractors' play is extremely important in achieving sustainable construction.
6. The contractors were asked if they were chosen to set up sustainable construction strategy; how will they prioritize the following items:
    a. Climate change & energy.
    a. Waste.
    b. Material.
    c. Cost.
    d. Water.
    e. Quality.
    f. Skills.
    g. Safety.
    h. Equity/respect for people.

The contractors considered that all items are important and linked with each other and it wasn't

easy to prioritize these items; however their choices were:

1. Climate change & energy.
2. Quality.
3. Material.
4. Cost.
5. Waste/ skills/ safety.
6. Water.
7. Equity.

The prioritization of the contractors reflected their awareness of the importance of environment and quality of work. (Ian, Roy, 2006).

The contractors' suggestions to over come the barriers were:

1. Government should take a vital role in encouraging investments in Palestine.
2. Promoting cooperation between contractors, clients and consultants.
3. Leveraging skills of human resources and continuous training is inevitable.
4. Using modern technology is important to obtain sustainability.

Comparison between the results of the short interviews and the questionnaires responses' assessments:

Both agreed on the following:

1. Political situation is the major barrier of implementing sustainability in West Bank – Palestine.
2. The role of the government is very important in implementing sustainability.
3. The cooperation between construction chains is extremely important.
4. People and technology are vital factors for implementing sustainable construction.

Chapter 5

Conclusions and Recommendations

Introduction:

This chapter consists of:

A. Key Findings.
B. The Main Keys of Achieving Sustainable Constructions.
C. The Importance of Implementing Sustainable Construction.
D. Conclusions and Recommendations.
E. Future Studies.

A. Key Findings:

The following are the notable findings of the research:

1. Palestinian contractors are highly educated, the research illustrates that 61.3% are university graduates and 9.40% are post graduates.

2. The Palestinian contractors have diverse experience and 56.6% are qualified for more than one field of work, 46.2% are classified as first degree at the Palestinian contractors union (PCU) in their field of work having attained the highest qualification. 35.8% of the contractors are classified as second degree; this clarifies the degree of competition between contractors.

3. As mentioned in the literature review; the construction industry is a paradox, in many ways. It is one of the largest industries, but the vast majority of its participants are small business (Barrie and Paulson, 1992); the research shows that 42.5% of the Palestinian construction companies employ 1-10 employees, and only 9.4% of the construction companies employ above 20 employees.

4. The geographical distribution of the contractors are normally in the regions were the concentration of the construction projects are; the highest percentage was in the central area which was 46.2%.

5. The results of the research illustrate that the seven chosen categories of the study are indeed the key barriers of implementing sustainable construction in West Bank – Palestine, upon contractors' assessment these barriers were prioritized as follows:
    a. Political situation.
    b. Legislation.
    c. Cost.
    d. Technology.
    e. People.
    f. Market.
    g. Time.

6. The contractors assessments and the highest rated questions showed that the top ten barriers they face from those main categories were:
    a. Instability and insecurity.
    b. Closures.
    c. Unpredicted cost according to the barriers of access and movements.
    d. No comprehensive planning for the needed projects.
    e. Dealing with different currencies under the same contract.
    f. Currency fluctuation.
    g. Cash flow mismanagement.
    h. Lack of strategic planning by authorities.
    i. Unpredicted conditions.
    j. Delays in consultant approvals.

    A profound analysis for the above items showed that almost all barriers are caused directly or indirectly by the political situation except three or four items that may refer to the Authority; related to planning and the last refer to the consultant approval.

7. The analysis of the minimal rated questions in the contractors' assessments reflected the contractors interest in training and in diversifying operations, the contractors consider fierce competition as a barrier that prevent sustainability. The Palestinian contractors face big challenges that encourage them to look for new methods of implementation and high technology but that will not be possible without having the capability to afford such expenses.

8. The research results of the six hypotheses were as follows:

    a. No effect was attributed to educational level, experience, specialization and classifications of the contractors on the main barriers of implementing sustainable construction in West Bank – Palestine, this result was not expected but the only justification was that; no matter what the level of the contractors' education, experience, classification or even specialization; the impact of the predominating political situation was stronger than any other qualification they may have. This result strongly connected with a result of a report made by the World Bank; "West Bank and Gaza Investment Climate Assessment: Unlocking the Potential of the Private Sector" which clarified that the Palestinian's perceive the unstable political environment and the resulting economic instability as the biggest constraints to doing business; other issues pale in comparison (2007).
    b. According to the deep analysis for the fifth hypothesis; the higher the number of employees the contractor has; the higher the possibility the cost becomes a barrier for the implementation of sustainable construction. In addition the less the number of hired employees the less the technology seems to be a barrier to implementing sustainable construction. On the other hand the more the contractor is using human resources the more the contractor is neglecting technology.

    c. The sixth hypothesis analysis result is; the contractors living in south area consider that the barriers to implementing sustainable construction increase due to location. This was clarified by the concentration of large scale projects in the central area, and the complicated access and movements.

B. The Main Keys to Achieving Sustainable Constructions:

How sustainable construction could be achieved? As mentioned in the literature review; the combined efforts of all stakeholders on all levels; will be the only way for implementing sustainable construction. Based on the data analysis and research results the following are the main keys to implement sustainable construction:

On the Political Level:

1. Ending occupation and instability.
2. National sovereignty.
3. Control on national resources.
4. Free access and movement.

Government Policy and Regulations Level:

1. Comprehensive and strategic planning for the needed projects (World Bank, 2004).
2. Protecting domestic market and promotion of national products.
3. Enhancing international trade by increasing and promoting exports and organizing and controlling imports.
4. Incentives for innovation and new projects such as recycling and reuse materials.
5. Providing incentives for saving and investments in the local market.
6. Preservation of the environment.
7. Raising the awareness of efficient use of resources and energy.

Market Level:

1. Increasing productivity; by promoting investments rather than consumption.
2. Increasing awareness of the whole life cost (Kirsty, John and Geraldine).
3. Enhance cooperation between construction chains.
4. Capacity building in sustainable procurement.
5. Controlling and monitoring of material selection and use." Responsible procurement" (The Kent design guide, 2006).
6. Using high technology and modern methods of implementation.
7. Continuous training and promoting skills of work forces.
8. Diversifying operations.
9. Waste and energy minimization.

On the International Level:

1. Concentrating the international efforts towards increasing the financial and technical assistance to Palestinians, especially in development projects that enhance productivity, capacity building and sustainable job creation (World Bank, 2004).
2. In the World Bank assessment report "Four Years-Intifada, Closures and Palestinian Economic Crisis"; the social economic stabilization plan (SESP) emphasized that donors responding to emergency needs; should not lead to the abandonment of longer-term development agenda (2004).

Cooperation and communication are from the most important factors to implement sustainable construction; if practiced by the government with experts from the public and private sectors. The vertical and horizontal communication; is needed to attain sustainability.

C. The Importance of Implementing Sustainable Construction:

1. Maintaining and Increasing the contribution of construction industry in the economy by reducing cost, saving energy, saving resources and time.
2. Focusing on increasing profitability through:
    a. Efficient use of resources and energy.
    b. Adopting modern methods and high technology for implementation.
    c. Reducing the on-going cost of maintenance.
    d. Increasing productivity; through creation of new projects, new jobs.
3. Saving environment by reducing waste, pollution and enhancing the policy of re-using materials and recycling (Livia,2003)
4. Raising the awareness of safety and precaution measurements
5. Improving the quality of life.

D. Conclusions and Recommendations:

The dissertation fulfilled the goals of the research from one side, but from the other side; opens the researcher's eyes on unlimited questions that made the argument of implementing sustainable construction in Palestine as ongoing research. The contractors are doing their best to be qualified, most of them are highly educated and experts in crisis management; they follow the policy of diversifying operations.

The barriers were clarified and priorities in this study were related to the implementation process only and from the contractors' assessments; as mentioned in the literature review; the construction sector has a very large spectrum of stakeholders / actors; each actor is of critical importance for the completion of the construction chain; if Sustainable Construction is to be mainstreamed. The barriers that stand in the way of mainstreaming must be clarified and prioritized from the point of view of each actor. The researcher believes that the barriers must be investigated from the rest of the construction chain point of view; to know if the problem is in the architects, or is in the clients. How they choose their projects, and how they decide their designs and specifications? Are they interested in implementing sustainable constructions? Is there any cooperation between the Government and the private sector to create national investments? The lack of capital and the absenteeism of the national currency; what are the hedging methods that are possible in such unstable political situation? What is the role of the government in such cases? Are the donations from donor countries well invested in the creation of sustainable projects? Do these investments meet the needs of Palestinians? Increasing productivity and creation of new jobs are main factors for achieving sustainability; to what extent may the donor countries contribute in enhancing those factors? Is it possible to achieve sustainability without sovereignty? The questions are unlimited and the challenges facing Palestinians are many. **Hence this leads to series of future studies that the researcher recommends;**

E. Future Studies:

1. The relation between the consultant and the contractors and the impact of this relation on implementing sustainable construction; reviewing the importance of sustainable designs and clients needs.
2. The importance of cooperation between the different parties related to construction chain.
3. The importance of decision-making and its effect on the implementation process.
4. Importance of national investment in construction and its impact on achieving sustainable development.
5. Comprehensive planning and its impact on achieving sustainability.

Finally; the researcher put this study for the service of all interested in implementing sustainability in Palestine, who cares to promote and contribute in the development process; this is just a step in a very long way.

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Appendices

Appendix 1: Questionnaire:

Dear Contractor,

As part of my MBA thesis at University of Robert Kennedy College – Zurich / University of Wales – UK, I am conducting a survey that investigates the Key barriers of implementing sustainable construction in West Bank – Palestine.

Sustainability is related to the quality of life in a community - whether the economic, social and environmental systems that make up the community- providing a healthy, productive, meaningful life for all community residents, present and future[1], by meeting the needs of today without compromising the ability of future generations to meet their needs.

Sustainable Construction aims to apply this principle to the construction industry by providing ways of building that use less virgin material and less energy, cause less pollution and less waste but still provide the benefits that construction projects have brought throughout history.2

Your answer to the questions in this questionnaire is highly appreciated. Please be informed that all personal information supplied is a top confidential issue.

Thank you for your cooperation.

Respectfully,

Najah Osaily

[1] http://www.sustainablemeasures.com/Sustainability/index.html, accessed on 2/5/2009.
[2] http://www.sustainableconstruction.co.uk/sustainability.htm, accessed on 2/5/2009.

Part 1. General Information:

Company name…….. Position: ……..

Education	□	High school or below	□	Diploma	□	BSC.	□	Post graduate		
Experience	□	1-5	□	6-10	□	11-15	□	Above 15		
Field of work	□	Buildings	□	Water & Sewerage	□	Electromechanical	□	Roads	□	More than one or other
Classification	□	First "A,B"	□	Second	□	Third				
Number of employees	□	Below 10	□	11-20	□	21-30	□	Above 30		
Location	□	South	□	Middle	□	North				

Part 2. Key Barriers of Implementing Sustainable Construction:

	First category:	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
	People impact on sustainable construction:					
01	Lack of awareness & understanding of sustainable construction.					
02	Lack of information/knowledge about sustainability.					
03	Inadequate skills.					
04	Lack of horizontal & vertical communications.					
05	Lack of surveillance & supervision.					
06	Change resistance.					
07	Short-term basis of projects & contracts of employment leads to employees' disloyalty.					
08	Lack of cooperation.					
09	Job interference or linkages between different teams.					
10	Lack of training.					
11	Absenteeism.					
12	Lack of incentives.					
13	Sustainable construction will be implemented by increasing resources to accelerate work.					

	Second category:	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
	Cost impact on sustainable construction:					
14	No relationship between construction cost and implementing sustainable construction.					
15	Limited projects released in the market; reduce profit margin.					
16	Fierce competition; enhance sustainable construction implementation.					
17	Emphasizing on lowest price for subcontractors will facilitate sustainable construction implementation.					
18	Projects limited budgets; prevent sustainable implementation.					
19	Cash flow mismanagement affects implementation quality.					
20	Search cost for secondary material upon consultant request; waste time and efforts.					
21	Absenteeism of national currency.					
22	Dealing with different currencies under the same contract - revenues in one currency & expenditures in other – affect deeply contractors margins.					
23	Fluctuation of contracts' currencies - conversion rates – harm deeply contractors' cost stability.					
24	Uncontrolled expenses for transportations ; equipments, etc. due to the segmentation of West Bank					
25	Access & movement of borders & ports yield unpredicted cost.					
26	Supply chain unawareness of whole life costing.[3]					
27	High cost of training workforce on new methods and technology.					
	Third category:					
	Time impact on sustainable construction:					
28	Lack of achievable planning harms deeply implementation process.					
29	Tight schedules facilitate implementing sustainable construction.					
30	Misuse of time schedule does not affect the quality of work.					
31	No relation between methods of implementation and sustainable construction.					
32	Delays in decision making by people who in charge.					

[3] http://www.sustainabilityinconstruction.org/UserFiles/File/Hunter%20Kelly%20and%20Trufil%20-%20CIB%2092(1).pdf accessed on 30/8/2009.

		Strongly agree	Agree	Neutral	Disagree	Strongly disagree
33	Delays in consultant approvals.					
34	Delays in material submittals to the sites.					
35	Conflicts between needed diverse teams in tasks linkages.					
36	Sustainable material not readily available.					
37	Training consumes time.					
38	Emphasis on speed.					
	Fourth category:					
	Technology impact on sustainable construction:					
39	Preconception towards traditional methods.					
40	Unavailability of high technology.					
41	Barriers of importing technology.					
42	High cost of technology.					
43	Technology perceived as risky, unreliable.					
	Fifth category:					
	Market impact on sustainable construction:					
44	No comprehensive planning for the needed projects.					
45	Lack of interest and demand from client & consultants.					
46	Supply chain dictates process "inadequate cooperation".					
47	Material, equipments shortages.					
48	Unprotected markets.					
49	Surpluses of inconvenience alternatives for materials and tools; help accelerate sustainable construction implementation.					
50	Inefficiency of equipments.					
51	Unique characteristics of each project "each project is a different story".					
	Sixth category:					
	Legal aspects "legislation" impact on sustainable construction:					
52	Lack of strategic planning by authorities.					
53	Lack support by local authorities.					
54	Limited enforcement.					
55	Lack incentives / grants.					
56	No regulations protecting national products.					
57	No regulations protecting customers.					
58	No regulations maintaining development process in manufacturing.					
59	Augmentation of regulations.					
	Seventh category					
	Political situation impact on sustainable construction:					
60	Instability, insecurity.					

		strongly agree	agree	neutral	disagree	Strongly disagree
61	Closures.					
62	Unpredicted conditions.					
63	Duplicate of restrictions and fees.					
64	Relying on grants and donations from Donor countries.					
65	Short term political goals.					

Appendix 2: Descriptive Statistics:

Q. No.	N	Mean	Std. Deviation	Q. No.	N	Mean	Std. Deviation
q1	106	4.0283	0.85588	q38	106	3.4057	1.10219
q2	106	4.0000	0.70373	q39	106	3.6321	0.97907
q3	106	3.7264	1.01918	q40	106	3.7264	0.94146
q4	106	3.5849	1.19418	q41	106	4.0566	0.81451
q5	106	3.2264	1.14877	q42	106	4.0660	0.7207
q6	106	3.4717	0.95825	q43	106	3.1038	1.07729
q7	106	3.7925	1.01152	q44	106	4.4245	0.64658
q8	106	4.1226	0.62796	q45	106	3.8208	0.89226
q9	106	3.9434	0.88188	q46	106	3.9811	0.89423
q10	106	4.1038	0.7162	q47	106	3.1887	1.10508
q11	106	3.7453	1.09598	q48	106	4.1887	0.60337
q12	106	4.0660	0.97852	q49	106	3.3491	1.17143
q13	106	2.1792	1.07612	q50	106	3.4245	0.98511
q14	106	3.4623	1.14787	q51	106	2.8585	1.06403
q15	106	4.2170	1.01423	q52	106	4.3302	0.72666
q16	106	2.7547	1.18572	q53	106	4.2453	0.76608
q17	106	3.6981	1.02511	q54	106	4.1226	0.75218
q18	106	3.8679	0.9266	q55	106	4.0660	0.88661
q19	106	4.3302	0.89146	q56	106	4.0472	0.76073
q20	106	3.8019	0.97022	q57	106	4.0943	0.65507
q21	106	4.1038	1.07729	q58	106	4.1038	0.72937
q22	106	4.4057	0.81391	q59	106	3.8302	0.93066
q23	106	4.3491	0.99563	q60	106	4.5000	0.77152
q24	106	4.2453	0.80251	q61	106	4.4811	0.69325
q25	106	4.4717	0.71989	q62	106	4.3019	0.69241
q26	106	3.6981	0.93778	q63	106	3.9623	0.83864
q27	106	3.2736	1.08262	q64	106	4.2642	0.80831
q28	106	4.1321	0.58677	q65	106	4.1415	0.95058
q29	106	3.0189	1.13793	Total	106	3.7079	0.24226
q30	106	3.6415	1.00654	tot1	106	3.6916	0.4392
q31	106	2.8962	1.07729	tot2	106	3.9063	0.31549
q32	106	4.1321	0.84036	tot3	106	3.5566	0.3640
q33	106	4.2736	0.86776	tot4	106	3.7170	0.54291
q34	106	3.6887	0.97944	tot5	106	3.6545	0.39095
q35	106	3.8868	0.87636	tot6	106	4.1050	0.49224
q36	106	3.1415	1.2757	tot7	106	4.2752	0.50082
q37	106	2.9057	1.28381				