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Duties and Attributes of Construction Projects Coordination in Gaza Strip

واجبات و صفات تنسيق المشاريع الإنشائية في قطاع غزة

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بِسْمِ اللّٰهِ الرَّحْمٰنِ الرَّحِیْمِ

"وَأَنْزَلَ اللَّهُ عَلَيْكَ الْكِتَابَ وَالْحِكْمَةَ وَعَلَّمَكَ مَا لَمْ تَكُن تَعْلَمُ
وَكَانَ فَضْلُ اللَّهِ عَلَيْكَ عَظِيمًا"

صدق الله العظيم

النساء - آية ١١٣

DEDICATION

- To my father soul...
- To my mother with all of my love...
- To my sisters and brothers, for their unlimited and generous support all the way...

Eng. Wesam Alool

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The completion of this MSc. thesis is the culmination of a long and eventful journey. This was a journey that I strongly feel, I would never have completed on my own. With that in mind, I would like to take this opportunity to express my heartfelt gratitude, to who this thesis would not have been possible without them.

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ABSTRACT

Construction industry is considered as one of the most important industries in Palestinian economy. It influences and is influenced by the gross domestic product pursuant to the political and economic circumstances. Construction is a complicated industry with multi stakeholders "donors, owners, consultants and contractors", with unstable external and internal circumstances. Coordination can be seen as a process of project managing in an organized manner so that a higher degree of implementation efficiency would be achieved. Inadequate coordination leads to adversarial relationships between construction parties, and violates the project constraints cost, quality and time. The aim of this thesis is to study the duties and attributes of coordination in construction projects in the Gaza Strip. Literature review was carried out, revealed to a lack of formal understanding in coordination of construction project. Nevertheless, the literature review, interviews and researcher experience led to identify 79 coordination duties which have been classified into six groups and 29 coordination attributes which have been classified into four groups. A survey was conducted by filling 184 arbitrated questionnaires. An exploratory factor analysis was applied to categorized coordination duties and attributes deeply into consistent clusters. Case study was investigated and compared with results, to obtain practical evidence of the results and specific information of coordination process in the Gaza Strip projects.

The duties results showed the rank of groups': contract implementation group (79.34%), quality and performance group (78.95%), planning and scheduling group (78.90%), health and safety group (78.14%), budget and cash flow group (77.85%) and resources and team management group (76.11%). The most important duties were, firstly, contributing in plan preparing for project procurement, implementation and tracking with RII of 87.89 %. Then, follow up the implementation of all contractual commitments, with RII of 87.09 %. Thirdly, provide an organized information archives as wariness from future claims, with RII of 84.01 %.

The attributes results showed the rank of groups': education and gained skills group (83.01 %), technical group (82.26 %), personal group, (79.50 %) and integrity group (67.07 %). The most important attributes were, firstly, his/her integrity to the project, work interest and relationship between parties, with RII of 92.46 %. Then, has sharp

charisma and independence in his decision, with RII of 90.40 %. Thirdly, liaison skill with being attractive and using all contact approaches and communication skills professionally, with RII of 88.11 %.

There is an essential need for assigning a coordinator for each project or program and providing him with suitable communications and transportation. Both donors and owners recommended qualifying the coordinators in the contractual issues and regulations and widening coordinators authority in budgeting and cost control. The consultants and contractors recommended qualifying the coordinator in materials samples and approval, beside wide experience in project main topic, preferring who has previously worked with project parties.

ARABIC ABSTRACT

يعتبر قطاع الإنشاءات من أهم القطاعات في الاقتصاد الفلسطيني. حيث أنه يؤثر و يتأثر في الناتج الإجمالي المحلي تبعاً للظروف السياسية والإقتصادية. صناعة الإنشاءات هي صناعة معقدة و متعددة الأطراف وهم "الممولين، المالكين، الاستشاريين والمقاولين". كما تتطور هذه الصناعة المتشعبة في ظل ظروف خارجية وداخلية غير المستقرة.

التنسيق هو عملية إدارة المشروع بطريقة منظمة بحيث يمكن تحقيق درجة أعلى من الكفاءة في التنفيذ. التنسيق السئ وغير الملائم يؤدي إلى العلاقات التضادية بين أطراف عملية التشيد، كما أن القيود على تكلفة المشروع والجودة والوقت لا تتحقق. هدفت هذه الدراسة إلى التعرف على واجبات وصفات التنسيق في مشاريع التشيد في قطاع غزة. خلصت مراجعة الدراسات السابقة إلى أن هناك نقص في فهم وتطبيق التنسيق في المشاريع الإنشائية. وخلصت الدراسات السابقة والمقابلات وخبرة الباحث لتحديد ٧٩ من واجبات التنسيق التي صنفت إلى ست مجموعات وأيضاً تم تحديد ٢٩ من الصفات التنسيقية وتصنيفها إلى أربع مجموعات. وقد أُجري مسح من خلال تعبئة ١٨٤ استبيان. تم تطبيق تحليل عاملي استطلاعي لتصنيف واجبات وصفات التنسيق بعمق في مجموعات متناسقة. وقد تم دراسة حالة للمقارنة مع نتائج الاستبيان، والحصول على أدلة عملية للتنسيق في مشاريع قطاع غزة.

أظهرت النتائج ترتيب مجموعات التنسيق حيث كانت كالتالي: مجموعة واجبات تطبيق العقد (٧٩.٣٤٪)، مجموعة واجبات الجودة والأداء (٧٨.٩٥٪)، مجموعة واجبات التخطيط والجدولة (٧٨.٩٠٪)، مجموعة واجبات الصحة والسلامة في المنشآت (٧٨.١٤٪)، مجموعة واجبات الميزانية والتدفقات النقدية (٧٧.٨٥٪)، مجموعة واجبات إدارة الموارد والفريق (٧٦.١١٪). وكانت أهم الواجبات هي: أولاً المساهمة في إعداد خطة لتنفيذ المشروع والتحضير والتتبع بنسبة ٨٧.٨٩٪. ثم متابعة تنفيذ جميع الالتزامات التعاقدية بنسبة ٨٧.٠٩٪. ثالثاً توفير أرشيف منظم من المعلومات ، حذراً من المطالبات في المستقبل بنسبة ٨٤.٠١٪.

كما أظهرت نتائج الصفات التنسيقية ترتيب المجموعات وكانت كالتالي: مجموعة صفات التعليم والمهارات المكتسبة (٨٣.٠١٪)، مجموعة صفات الخبرة الفنية (٨٢.٢٦٪)، مجموعة الصفات الشخصية (٧٩.٥٠٪)، مجموعة صفات الاخلاص (٦٧.٠٧٪). وكانت أهم الصفات هي: أولاً له / لها إنتماء للمشروع ومصحة العمل والعلاقة بين الأطراف بنسبة ٩٢.٤٦٪. ثم لديه/ها الكاريزما القوية والاستقلال في القرار بنسبة ٩٠.٤٠٪. ثالثاً مهارة الاتصال واستخدام أساليب التواصل بمهنية بنسبة ٨٨.١١٪.

أوصت الدراسة بعدة إجراءات عملية لتحسين عملية التنسيق في مشاريع البناء. حيث هناك حاجة ضرورية لتعيين منسق لكل مشروع أو برنامج وتزويدهم بوسائل اتصالات وتنقل مناسبة. كما أوصت كل من الممولين والمالكين بتأهيل المنسقين في المسائل التعاقدية والأنظمة السائدة وتوسيع سلطة المنسقين في الميزانية ومراقبة التكاليف. وأوصت الاستشاريين و المقاولين بتأهيل المنسقين في أخذ عينات واعتمادها، إلى جانب توسيع خبرتهم في موضوع المشروع الرئيسي، ويفضل الذي عمل سابقاً مع أطراف المشروع.

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LIST OF ABBREVIATIONS

ADP	Area Development Plan
ANOVA	Analysis Of Variance
B.Sc	Bachelor of Science
CDD	Community Driven Development
DORA	Department of Refugee Affairs
GDP	Gross domestic Product
IT	Information Technology
KMO	Kaiser-Meyer-Olkin
LGUs	Local Government Units
MOF	Ministry of Finance
MOH	Ministry of Health
MOLG	Ministry of Local Government
NGO	Non- Governmental Organization
OC	Oversight Consultant
OM	Operations Manual
PA	Palestinian Authority
PCBS	Palestinian Central Bureau of Statistics
PCU	Palestinian Contractors Union
PMT	Project Management Team
PRDP	Palestinian Reform and Development Plan
PSGs	Program Support Groups
RII	Relative Importance Index
SPSS	Statistical Package for Social Sciences
UNDP	United Nations Development Program

UNRWA	United Nations Relief and Works Agency
US\$	United States Dollars
VNDP	Village and Neighborhood Development Project
WB	World Bank
WBG	West Bank and Gaza

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CHAPTER 1

INTRODUCTION

1.1 Background

Construction industry characterized with high fragmentation, cost and time overruns, and high rate of failure. Construction projects involve many parties namely; contractors, consultants, clients, donor, suppliers, subcontractors. Management of those different parties without coordination is very disturbing work; as every party has its own objectives regardless of others objectives (Brien *et al.*, 2008; Hinze and Wilson, 2000). The characteristics of construction industry are major causes of performance-related problems, facing the industry development compared with other industries. Those conditions make this industry special in its environment; so that an early coordination and responsibilities distribution is a critical task in construction project management success (Trigunarsyah, 2002; Xue *et al.*, 2007).

The nature of the construction projects makes the industry unique. The plant may be moved to the construction site, in order to be compatible with any project uniqueness. In construction case the optimum plan in a project may be not very suitable to others (Hinze and Wilson, 2000). Many variables and complex relationships exist between construction parties; that must be considered in the coordination of construction projects. The coordination and cooperation between skilled labor, materials and equipment suppliers that are used in a project, require daily application of proper business practices and tracking to all details (Lin *et al.*, 2006; Einarsson, 1998).

There are a lot of interfaces which need coordination such as contractor and his subcontractor. Because subcontractors do not seeing the large picture outside their own trade, they have to be explained that once they finish, this is not the end of the job but only the release be work for the following trade's implementation, which mean more coordination will needed (Weidman, 2010; Caballero *et al.*, 2001).

Construction managing is highly practical profession and demands for efficient management. Control in construction are growing due to the increasingly complexity of construction projects. Both the internal and external environments of construction projects are relatively unstable; in this unstable environment all construction parties trying to implement the project such as total quality management and lean strategy to improve their products and services. This implementation cannot be achieved without strong and wide range of the relationships between all parties. A complete coordinated

project needed by synchronization and integration of activities and responsibility, commands and control structure to ensure that resources are used efficiently in pursuit of the objective achievement (Kubicki *et al.*, 2007; Olson, 2000).

The objective of projects management is to ensure the success of a project. Success itself is a subjective term as depending on the needs, expectations and adversary goals of individual and different stakeholders. Continues coordination has been developed as a powerful tool to ensure the achievement of construction work, not only between the different parties but also between the members of the same party as general contractor and his subcontractor and suppliers. By minimizing the inadequately and the rework of defects, the satisfaction status and objectives achievement increased. This is the moral of coordination process (Olson, 2000; Jha and Iyer, 2006).

Coordination is unifying, harmonizing and integrating different parties involved in any industry with multiple objectives. Coordination, as the most important factor in construction projects, when multiple participants; donors, consultants, contractors and subcontractors are involved. In construction industry, the active coordination could minimize, predict and remedy problems caused by design modification lead-time, materials availability, manpower usage, and equipment availability. Which make the implementation of the construction projects more smoothly and to be facile (Jha and Iyer, 2006; Huemer, 2006).

1.2 Characteristic of construction industry in Gaza Strip

Construction industry is considered to be an engine in the national economy. It is a large, mature business and it has many important links to the rest of the economy. The importance of the construction industry to the economy can be measured by its contribution to the Gross Domestic Product (GDP); its contribution to investment, and the amount of manpower employed. Internationally, the construction industry contribution to the GDP is about 3-16 % (Pamulu, 2010). In the Gaza Strip it's usually accounts for 2.51-13.6 % of the GDP succeeding to the political situation (PASSIA, 2008).

The problem in Gaza Strip, as one of the third world regions, is the lack of the natural resources. That mean there are no internal and self-funds for development and improvement strategic projects in all public and privet sectors. This situation is very adequate for external funds and foreign intervention with their own goals and objectives. The external and foreign intervention has a major influence on projects and leading directly to disputes, reworks, variations and contributes in increases the time and cost of the projects (GESR, 2011).

According to Palestinian Central Bureau of Statistics (PCBS) report in 2008, it was shown that, 11.6% of the employed persons in the Gaza Strip were working in construction. The closure of border crossings imposed on Gaza Strip since uprising of El Aqsa intifada has caused bad impacts on the Palestinian economic, social, cultural, and civil obviously on the construction industry (PCBS, 2008).

Construction projects have been completely stopped due to preventing entry of construction materials, especially cement, aggregate and steel into Gaza Strip. Consequently, many infrastructure projects, including roads and sewage systems, have been suspended for political considerations in 2006; which led to completely stopped of the construction sector until the 2009 war on the Gaza Strip.

The construction industry in Gaza Strip is considered to be one of the main industries. It has grown significantly since establishing of Palestinian National Authority in 1994. In 2000, the sector employed over 22% of the work force. The construction materials imported through Gaza crossings before the 2007 blockade comprised over 52% of the total imports to Gaza Strip. The PCBS estimated the value of implemented projects in 2010 is over 900 million \$. However, the sector performance and growth in Gaza Strip

slowed down as a result of political factors. The contribution of construction industry in the Gaza Strip indicated in Figure 1.1 as reported by PASSIA (2010):

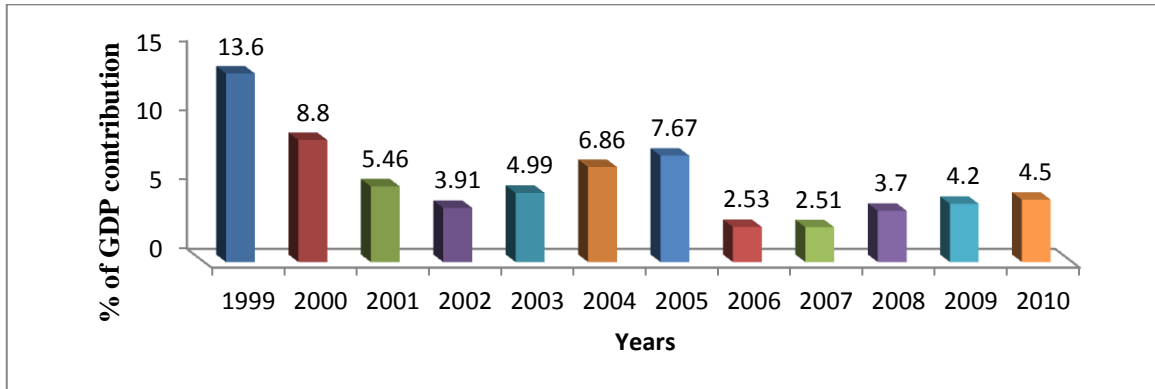


Figure 1-1: Percent of the constructions contribution in the GDP from 1999-2010.

Figure 1.1 shown that, the highest construction contribution in GDP was in year 1999 which showed 13.6 %. However, the contribution declined in years 2001 and 2002 due to border closure after the start of El Aqsa Intifada in 2000. Another decline was shown on 2006 and 2007 due to the siege imposed on Gaza Strip, this siege paralyzed the construction industry and caused a lot of project suspension or completely stopped which led to disputes and conflicts. The small increase in 2010 is a result of the political openness after the war on Gaza Strip (PASSIA, 2010; GESR, 2011).

A great demand in construction is a result from insufficient construction during the blockade, representing a significant opportunity for the construction sector if the political environment moves forward positively. Tens of building, roads, infrastructure, schools and other projects were suspended pending the availability of construction materials. In the same time many existing building have received no maintenance in recent years. Furthermore, over 35,000 residential units were needed especially after destroyed during the military assault on the Gaza Strip (PASSIA, 2008).

It is worth mentioning that construction materials were the first items to be banned upon the inception of the blockade. Israel continued to keep these materials on the blocked items list until early 2010. The pressure from the international community resulted in partial allowance of some materials. But the quantities allowed were not sufficient for major projects. The continued international pressure has led to the entry of such materials, under the responsibility of the international agencies like United Nations Relief and Works Agency (UNRWA) and United Nations Development Program UNDP (GESR, 2011).

1.3 Problem statement

Construction processes span multiple parties and involve various stakeholders with competing objectives. Such process needs harmony and coordination to fulfill its objectives; therefore construction projects coordination is a very critical task.

The relationship between constructions parties differ from project to another. The responsibilities of coordination in Gaza Strip are subject to misunderstanding; therefore construction field has witnessed several problems and conflicts in this area. Also, there are no specific criteria for selecting the best coordinator "critical position" based on his attributes, which must consist with his duties and responsibilities. However, coordination is an abstract concept and difficult to be measured quantitatively. It has been measured using a combination of other factors such as centrality and the strength of relations and social ties. This circumstance make the measure process of coordination duties and attributes unclear and need more research.

The duties of the project coordinator are a much disputed issue especially in the implementation stage, in term of excluded and included which mean there is no clear cut of his responsibilities for every unique project based on the project parties' objectives. That mean, the coordination duties issue need more determination and justification in Gaza Strip construction projects.

Issam (2002) studied the factors which would improve construction quality on the construction industry in Gaza Strip. The coordination classified as essential first step towards a real improvement of construction quality in Gaza Strip, and recommended for more investigation in construction projects coordination.

1.4 Research aim

This research aimed to improve and development of the coordination duties and attributes in construction projects in the Gaza Strip.

1.5 Research objectives

The principal objectives of this study are:

1. To study the coordination process in construction projects in Gaza Strip.
2. To investigate the coordination duties and responsibilities in Gaza Strip projects.
3. To identify main attributes of coordination process in Gaza Strip projects.
4. To determine the best job description and characterization for project coordinator in Gaza Strip.

1.6 Research importance and contributions

The contributions of this thesis are expected to be relevant to both researchers and practitioners:

- To researchers, the findings should help to bridge the gap in project coordination literature and give some insight into project coordination from the stakeholders' perspective. Thus serving as a launch pad for further studies in this area.
- As for practitioners, the findings should highlight the practical importance of better understanding of project coordination duties and attributes. Given the high failure rate of project goals and objectives achievements, practitioners need better solutions on how to tackle these projects failure through coordination.

1.7 Research scope

This research was conducted with construction industry parties and their team members working in construction in the Gaza Strip. The teams' projects to be studied were ongoing building or finished civil engineering projects. As applicable to this research, "Team members" refers to practitioners such as an engineer of any discipline (Civil/architect) or any other technical person who had been working closely with the construction on the project.

1.8 Brief research methodology

The focus of this research was to identify and evaluate the important duties and attributes of construction projects coordination in order to ensure successful completion. A preliminary questionnaire on duties and attributes requirements for project coordinators, prepared using available literature. In addition to that, professionals from the industry were selected in un-structure interview to develop the questionnaire. Case study was selected for deep investigated. Finally, factor analysis was done for more identification and classification. The methodology discussed briefly bellow:

1.8.1 Literature review

This study reviewed the relevant literature on the subject of coordination in construction industry, review the attributes, duties and authorities of the project coordinator, and will also include review of the effects of the coordination presses on the final quality and performance of the construction projects and the level of stakeholder's satisfaction.

1.8.2 Questionnaire development

A survey questionnaire was used to collect the necessary data. This technique provides a large number of samples for a meaningful empirical investigation. Additional information was provided from face-to-face un-structure interviews with selected professionals during site and office visits to improve the questionnaire design.

1.8.3 Pilot study

Data collection took the form of a structured questionnaire; as an initial step in questionnaire development, factors from previous researches on the subject were considered, and then a modified questionnaire was developed including input from a pilot study and interviews with some construction professionals. This pilot study conducted to test the validity of the questionnaire through in-depth interviews with selected project coordinators to explore their perceptions of questionnaire clearness and quality.

1.8.4 Data analysis

All the data which was collected from the final questionnaire was analyzed using widely statistical methods. Univariate and multivariate analysis techniques were adapted to analyze the responses and identify critical coordination attributes and duties, and evaluate their impact on the projects performance and successful project closure. Besides statistics summary of responses such as means, standard deviations and frequencies; most univariate analyses included hypotheses testing using t-test, relative important index (RII) and multivariate analysis comprised mainly factor analysis were used. Hence factor analysis is considered as appropriate statistical method, this powerful statistical method aimed to providing greater insight into relationships among numerous correlated of factors, but seemingly unrelated variables in terms of a relatively some underlying factor varieties.

1.8.5 Case study

Case studies become particularly useful, where needed to understand some particular problem or situation in depth. Data regarding project coordination duties and attributes were collected for case sample of large construction project, which was obtained for better understanding on the scope of research problem. The case was analyzed through their parties, beneficiaries and documents available to give an overall impression of project implementation phases. This case also aimed to identify the effect of good and bad projects coordination such as conflicts on project cost, time and the overall goals achievement, and the main value come from review the questionnaire results on the case study and test the result verification.

1.9 Research structure

Chapter 1: Introduction

Present a general introduction to the duties and attributes of coordination construction projects. A general view about construction industry in Gaza Strip, aim, objectives, scope and methodology of the study were stated.

Chapter 2: Literature review

Present a theoretical framework for topics related to duties and attributes of coordination in construction industry in the latest publication.

Chapter 3: Research methodology

The questionnaire design, pilot study, sampling, data collocation and method of data analysis were presented, in addition to statistical tests used and its role. The validity and reliability tests and its indicators were presented.

Chapter 4: Results and discussion

Present the results achieved their statistical analysis and discussion. Firstly for the coordination duties and attributes group, then between the groups clauses were stated. Finally, results were compared with related studies results.

Chapter 5: Case study

Presents the results of case study form a previous construction project that was implemented in Gaza Strip in latest three years. Problems encountered in this case was outlined and discussed in detail in order to verify the study results on practical.

Chapter 6: Conclusions and recommendations

Presents conclusions and recommendations form the questionnaire results and case studies investigation in comparison with literature.

References

All references used as sources of data or information were presented, with full details as easy as possible for future review.

Annexes

Two copy of questionnaire "Arabic and English" were presented and another relevant data for more details

CHAPTER 2

LITERATURE REVIEW

2.1 Definition of coordination

Several researchers focused on the definition of coordination. Based on Malone and Crowston (2004) coordination is “orderly arrangement of group efforts to provide unity of action in the pursuit of common goals”. Xu and Beamon (2006) defined the coordination as “the integration of several parts into an orderly whole to achieve the purpose and objectives of project”. The previous definitions of coordination maintained that, management seeks to achieve the integration for coordination through its basic functions of planning, organizing, staffing, directing and controlling. However coordination is not a separate function of management (Shehu and Akintoye, 2010).

Coordination can be defined also as “managing dependencies between activities and its multilayered, involving the orchestration of relationships, not only at headquarters but also at the regional, national and field levels” (Sabherwal, 2003). This representative definition of coordination agrees with the concept of integrating or linking between different parts of organization to accomplish a collective set of tasks (Hossain, 2009).

In projects management, coordination means “different people working on a common project, agree to a common definition of what they are building, share information, and mesh their activities”. To build the project efficiently, they must share detailed design, specifications and information about the progress of project phases. The works must be coordinate to gets success completion and fits together, so that they aren't done randomly, works components are handed off expeditiously and in adequately manner (Qian *et al.*, 2001; Chen and Partington, 2006; Arto *et al.*, 2009).

In construction industry, the active coordination could predict, minimize and remedy problems caused by industry complication and multi-parties involvement. Design modification, lead-time, materials availability, manpower usage, and equipment availability make the implementation of construction projects needs more coordination to be smoother (Jha and Iyer, 2006; Huemer, 2006; Xu and Beamon, 2006).

Malone and Crowston (2004) defined the coordination as managing the dependencies between activities of the different trades in the project. It is a mutually beneficial and strong relationship entered into by two or more of party "general contractor and subcontractor" to achieve common goals (Zheng *et al.*, 2010; Lau *et al.* 2004).

From the previous review, coordination in construction management can be defined as "coordination of independent trends to improve the performance of the whole parties and objectives achievement. Consider their individual needs and widening the cooperation between them and the others parties".

2.2 The effect of coordination on the construction project

Coordination is not only at headquarters but also at the regional, national and field levels by increasing the coordinator authorities, more positive effect on the project. As a consequence, the top down principal agent perspective of coordination needs to be reconsidered. Hossain (2009) and Mohsin *et al.* (2009) concluded that, as curtailing the coordinator power and minimize his decision area the duration to complete any task will take additional time. To achieve all the project objectives and get the completion of the project within the time scheduling and planed budget, the coordinator must have the needed power.

Xiu-lin and Wen-xiu (2011) studied the coordination performance and its effect on the final view of the projects in the construction industry, they found that, coordination authorities on a high level construction management is not only objective requirement of balancing and continuity, but also an important way to protect optimize resource allocation of construction team and the quality of the project.

Doloi and Young (2009) and Parolia *et al.* (2007) maintained that, there are a relation between coordination and risk in construction management. As the coordination increased and involved more parties; the risk in construction project become less and less. In the same time, the uncontrollable risks should be considered during the initial stages of construction process coordination, as the chance of rectifying the mistakes demises rapidly over construction phase, competence and willingness coordinate between each other to face the risks in the projects.

Donini and Niland (1994) studied the factors affecting cost overruns in construction developments through a questionnaire. They found that, the coordination of project activates at the early stages of the building design process is an important factor. The ability to complete the full coordination throughout the construction phase of a development is paramount to a projects success (Lau, *et al.* 2004).

Tafunsak (2011) and Iyer and Jha (2005) stated that construction industry suffer a wide fragmentation status, this fragmentation made each trade on construction need high level of coordination with others trade, to be harmonize with the final project close. Without coordination in construction, the work will be deformed and decisions will be signally. Coordination can be considered as the distributing of decision making of organizations or participants on the flow of material, information, human, and cash flow in supply management from systems perspective.

Chen and Partington (2006) and Xu and Beamon (2006) discussed the coordination between the successive trades in construction. They found that, coordinate installation of different components to ensure performance and accessibility for required service and make adequate provisions to accommodate items scheduled for next installation.

Smith (2005) and Choo *et al.* (1999) asserted that coordination in master scheduling for construction projects transfer the complicity in implementation to systematic process. However generate sound schedules with coordination under complex constraints and preferences, provide capabilities to manage the projects in dynamic execution environment. Further, for a scheduling to be with real value, the coordination updates have to keep pace with the execution.

Sriprasert and Dawood (2003) stated that scheduling concept with step further and incorporate subcontractor schedules within master schedule. As a result of full coordination to ensure that the schedule will be very representative to the work in the site. The conformity with subcontractor schedules and resources available to works in the project must be checked without any delay of the others trades schedules (Kim, and Paulson, 2003).

Iyer and Jha (2005) studied the effect of personal rapport on coordination in India. They concluded that, coordinating ability and strong rapport of project coordinator with top management, team members, and subcontractors also makes the implementation smoother and the cooperation is the governing feeling. This attribute mainly points toward the interaction or personal rapport with the participants. Often coordination by personal rapport with different project participant can save a lot of cost and complete the project with goals achieving and high level of satisfaction for all stakeholders in the project. Individual rapport coordination can lead to provide helping hand and sometimes

reducing the necessary paper work or action, going simultaneously there by reducing considerable time and hence final cost (Arto, *et al.* 2009).

Doloi and Young (2009) analyzed coordination strategies on the bases of two dimensions. Formality (from informal personal meetings to more formal arrangements), and decision localization (centralized or decentralized). According to their study, an increase in dependency will cause an increase in formality, level of control, and centrality, which increased the need of coordination on all managerial level. The coordination will integrate this dependency and release any conflict between them. The role of the coordinator changes the relative desirability of centralized vs. decentralized information as a method of overcoming challenges in timely information.

Caldwel (2008) studied the process of information coordination on the laboratory of soil and materials. The study has conducted a number of laboratory and field investigations. He concluded that, the effects of delay information flow and how coordination processes in team and organizational performance contexts reduce delay and improve the work cycle in projects. The continuous coordination made the process of decision making very powerful on test and feedback. The laboratory results are very important in steps of decision for materials used or not used. Coordination refers to the pattern of interactions, decision-making and communication that takes place amongst the project (Huemer, 2006; Shehu, and Akintoye, 2010).

Chen and Partington (2006) researched on coordination in construction sites; the most important aspect of their work was coordination between every task, every trade on site improves the implementation sequence and minimizes the waste. Coordination mean, sure that things happen in sequence and on the dates wanted to be happen, and making subcontractor complies with what wanted to be done.

Parolia *et al.* (2007) examined the effects of horizontal and vertical coordination on project performance. They concluded that, successful projects result from coordination among team members, partners and stakeholders. The results indicated that horizontal coordination can enhance the level of leadership empowerment transfer, and help to clarify the mission and objectives among team members. Vertical coordination can enhance knowledge transfer between different levels of management. The results present that, project performance will improved by continues and wider coordination (Xue, *et al.*, 2007).

2.3 Duties and responsibilities of coordination

Project coordinator has a set of activities with known durations and scheduling within a given horizon. There may be both precedence and corporate restrictions (two activities are corporate if scheduling one implies the other) must be scheduled. The project coordinator's problem is to identify their responsibilities and their start times in the project sequence. An efficient solution procedure is developed by illustrating the coordination duties and responsibilities to maximize the net value of the project objectives (Munns and Bjeirmi, 1995; Malone and Crowston, 2004).

Jha and Misra (2006) studied the duties of coordination in construction through interviews with experts. Their study led to the identification of 59 of duties. The duties were eliminated by questionnaire survey conducted among Indian construction professionals. Recognize 20 important coordination duties, essential for achieving project objectives. The second level of questionnaire survey was then conducted using the 20 coordination activities. After they analyzed the 20 coordination activities they give the RII and selected the highest six activities which affect significantly in enhancing coordination rating of the project. The analyses indicated that, contracts and agreements implementation and follow up between parties and preparation of a project quality plan in line with contract specifications observed to contribute estimation of the optimum resource requirements has the highest positive effect on achieving coordination (Kim and Paulson, 2003).

Chen and Partington (2006) observed that the big step from site management to project management is coordination. Project coordinator has to focus on the big view, but inside that big view, he needs to encompass all items and parties there. He is like conducting an orchestra and needs to be able to foresee a problem and to coordinate before it happens, aimed to avoid it.

Mohsin *et al.* (2009) noted that, the effect of a given coordination activity would vary across different project objectives, e.g., if completion of project on time is of prime importance then a different set of coordination activity would be emphasized than those activities which help achieving cost saving, quality enhancement, or dispute reduction. They summarized some of project coordinator duties and responsibilities as following:

Point of Contact: Communication, correspondence, and meeting attendance.

Scheduling: Develop and maintain master schedules of all key construction activities, considering all subs scheduling and envelopes.

Contractor Coordination: Provide general coordination and facilitate weekly coordination meetings amongst all active developers and contractors to address project schedules, phasing, and construction details.

Impacts and Solutions: Identification and documentation of the critical issues and problem areas anticipated or experienced with each project. Endeavor to resolve all issues as they are identified or arise.

Meeting Facilitation: Provide meeting facilitation, including agenda preparation, meeting notes, and follow-up.

As-Built drawings: Assure all “as-built” construction drawings are updated and accurately representative of the actual implementation works.

Tafunsak (2011) and Lin *et al.* (2006) believed that, the project coordinator activates as, prepare memoranda to be distributed to each party involved administrative and technical instructions. Include such items as required notices, reports, and list of attendees at meetings. Also the administrative procedures in coordination of construction projects were summarized. Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the work. Such administrative activities include, but are not limited to the following:

1. Preparation of contractor's construction schedule and its value.
3. Installation and removal of temporary facilities.
4. Delivery and processing of submittals.
5. Progress meetings arranging.
6. Pre-installation meeting arranging.
7. Project close out activities and handover.
8. Startup and adjustment of systems.
9. Documentation and as built drawing of the project.

According to Xue *et al.* (2007) and Huemer (2006), construction project coordinator typically must have identified duties and responsibilities, to facilitate the development of construction projects and ensure the project objectives achievement for all construction parties. The duties given after questionnaire survey and expert review are concluded as:

1. Coordinate meetings to discuss project requirements and scope of work with requesting departments.
2. Prepare and review project plan based on engineering and architectural specifications; review site of proposed work to determine design parameters and constraints.
3. Issues work orders, a schedule work and inspect progress.
4. Communicate ongoing work schedules and project progress with requesting departments.
5. Monitor job costs, evaluates change orders and estimates costs of work.
6. Inspect work performed by contractors on assigned construction or remodeling projects.
7. Assist in evaluating completed projects.
8. Create and reviews plans designated by others to develop schedules and to insure compliance with building codes and guidelines.
9. Supervise lower level employees as required.

For the designer or engineer with coordination role seven activities are identified and represented by Merloa and Girard (2004):

1. Structure design: structure the technological system to design centers and identifies their related design objectives.
2. Select resources: select resources for each design from resource pool and organizes corresponding teams according to their skills.
3. Establish the schedule, the performance indicators and the control steps that they have to apply.
4. Define gaps: analyze feedback information from design during control steps and identifies gaps between indicators and initial objectives.
5. Realize diagnostic: evaluate reached performance and establishes diagnostics.

The meaning of these duties in construction management was closely related to predicting and managing potential problems. Its focus was not only on the work interfaces, but extended to every employee and every item involved in the project. In line with their focus on potential risks and problems, project coordinator tried to conduct all parties and coordinate to avoid conflict issues. Project coordinator has the full responsibility for the job; so he must be able to put every employee involved in the project stages all together. It is not just the field work, which is the site job, but involved others duties as office work (Sabherwal, 2003; Parolia *et al.*, 2007).

The increasing awareness of environmental impacts from construction wastes has led to the development of waste management as an important function of construction project coordination. In addition, for every \$1 billion of construction, \$500 million is material costs, 20% of that material is scrap, that result in \$100 million of materials is waste. Various approaches for managing and reduced construction wastes have been developed in four waste management strategies as; avoiding waste, reducing waste, reusing waste, and recycling waste. All of those approaches will not be success without coordination from the begging of materials process until final installation, as considering the standard dimensions during design stage (Shen and Liu, 2003).

In fact, construction wastes pass through a number of processes from generation to final reuse or disposal, those processes need continues coordination between all construction parties from supplier to final labor who do handling and installing process on construction sites (Shen and Liu, 2003).

Shen and Chang, (2011) maintained that, the proper follow-up and coordination of construction materials processes can improve waste management effectiveness. To minimize avoidable wastes of construction materials, by follow-up from the design stage for dimensions and shapes selection to consist with the standardized trade's dimensions and shapes in the market. The coordination process must continue to minimize the handling presses and storage as possible in order to reduce the opportunity of broken and damages.

Health and safety in construction is one of critical issues. Achieving project safety objectives in construction, coordination has paramount importance. Coordination efforts on construction projects are closely related to safety performance. Suitable

coordination means that, the job will precede smoothly, the necessary tools and materials available, so that construction project will implement safer.

There are linking between safety performance and project coordination, were the project with better rated abilities to coordinate construction activities had better safety records. It's generally agreed that more complex projects have greater numbers of specialty contractors or subcontractors. Coordination will covert complexity to smoother work which means less hassle in the worksite, less hassle is good for safety.

The main role of coordinator in safety guarantee and monitoring is through safety program preparing, personal protective equipment availability, safety meeting arranging and monitor the application of all safety regulations related to the project complexity and dangers works content.

2.4 Attributes and characteristics of coordinator

Modern construction projects are no longer confined to a single discipline and are generally multidisciplinary. Typically a large multidisciplinary project needs coordination among the personnel of different departments besides construction parties were involved in these projects. Coordination attributes become even more critical and must be well described with specific attributes, to facilitate the projects management process (Chen and Partington, 2006; Iyer and Jha, 2005).

Hiring a coordinator is one of the most important decisions a coalition can make. Xu and Beamon (2006) maintained that, the purpose of the coordinator in construction projects is to minimize the impacts of projects complication by working directly with contractors, developers, residents, and owners to coordinate construction activities within the project limitations. Some attributes were recommended for the project coordinator based on the university certification and practical experience as the following;

Qualifications: Bachelor's degrees form a college or university in; Construction Management, Civil Engineering, Planning, or a related field.

Experience: Five to ten years in construction management, engineering, or planning.

Lau *et al.* (2004) studied the coordination attributes in construction through several projects. They considered matching among the academic certification and practical experience. While they emphasized that communication skill is an indispensable part of coordination.

This requirement and qualifications "work experience and education" are to provide the required knowledge, abilities, and skills to the specified degree which aimed to complete the job and do the duties needed professionally. These qualifications prepare project coordinator to deal with every party in the project strongly and professionally. Coordinator will not face any difficulty in treatment and dealing with the other parties to minimize the conflict and disputes. The motivation for understanding the best coordination attributes is to minimize the costs associated with coordination. A coordinating node must invest time and effort to maintain the communication network infrastructure (Xue *et al.*, 2007; Artto *et al.*, 2009).

Xu and Beamon (2006) concluded that, coordination mechanisms may be differentiated bases on four attributes: resource sharing ability, decision making style, level of control, and risk sharing ability. Knowing that the selection of a coordination mechanism is often aimed to minimizing disputes and relative costs through considering the assigned attributes.

The organizations do not operate in a vacuum, in other words, any organization can't implement projects without high level of coordination considering the best attributes for the project environment. Three environmental factors will be considered in coordination: the interdependence between organizations, uncertainty, and information technology. Moreover, the objective of considering those factors is to develop a framework that enables organizations to select appropriate coordination mechanisms (Chen and Partington, 2006).

Xue *et al.* (2007) pointed out that, there are two attributes associated with different coordination structures: information structure (how coordinator share, perceive, and communicate information) and decision function (how coordinator decide what actions to take). Within the decision function, there are two classes: centralized and decentralized. Another important dimension to consider in construction management coordination, where risks and benefits define the need for coordination, is how to allocate the risk by coordination. Each organization seeks to implement coordination mechanisms that increase benefits and reduce risk. So, the allocation of risks and benefits strongly influences organization's coordination. They assign negotiation skills as one of the coordination attributes; therefore a successful coordinator is professional in negotiation. For example, the participants have a commitment and agreement on what is actually the matter under negotiation to make every party feel satisfaction (Hossain and Wu, 2009).

Some valuable attributes for good coordinators must be in the candidate who is considering or the individual currently serves as project coordinator, possess a majority of the following traits:

❑ **Able to motivate and inspire**

Iyer and Jha (2005) and Xu and Beamon (2006) enumerated the attributes related to motivation and incitation the employees work with him to improve the satisfaction:

- Has an ability to say and do things that give others a feeling they are playing an important part in whatever is being done.
- Communicates clearly.
- Demonstrates confidence in their abilities.
- Let's people know how they are progressing toward the group's goals.
- Recognizing the contributions of others.
- Stimulating others' thinking.

❑ Possesses knowledge and enthusiasm

Possesses knowledge about the project main works and be full of enthusiasm to charge the work environment context, according to Iyer and Jha (2005) and Xue et al. (2007) this group consist the following attributes:

- Knows the latest information, statistics, trends, and programs related to the project worked on.
- Has courage, self-confidence, and decisiveness.
- Has persistence, patience and will push ahead "when things bog down".
- Knows the strengths and weaknesses and works hard to enhance the best qualities and minimize the impact of any weaknesses.
- Originates ideas and does not hesitate to make decisions when appropriate.
- Stands up for what is important, adjusts plans and actions as necessary.
- Assumes responsibility and has appetite to take the initiative.

❑ Is a good communicator

The ability to contact with the all level of work professionally is very critical in construction project coordination. Qian et al. (2001) and Iyer and Jha (2005) referred to this group with the following attributes:

- Speaks and writes simply, clearly and persuasively.
- Can sum up the opinions of groups in the project, and express them decisively.
- Communicates regularly with the groups and manage meeting professionally.
- Is thorough, and tries to put things in writing to avoid the pitfalls of forgetfulness, particularly when dealing with many people and a variety of projects and activities.

Project coordinator is appointed as a representative of the project manager "in some cases" to proactively ensure future events will occur as planned, and solve signal problem areas and recommend solutions. According to Xue *et al.* (2007), the main characteristics of project coordinator are:

- Knowing of organization works.
- Has smartness to support organizations.
- Independence in his decision.
- Cleverness planner with accurate result in case of forecasting.
- Adhered in tracking.
- The ability to do more than one task in the same time.

Previous studies have also recognized the need for a project coordinator and distinguish attributes of a project coordinator in construction projects. In term of hierarchy, Hossain (2009) placed project coordinator in between project administrator and technical level. He concluded some attributes like planning, analyzing and understanding of the organization, are the required skills to carry out his administrator responsibility. The technical experience is the way in which any conflicts between items installations can avoid. The proposed attributes will provide the project coordinator with rightness opinion in all fields.

Hossain (2009) maintained that, wasting of time and cost in construction projects is due to poor coordination attributes, caused by inadequate information insufficient, inappropriate, inaccurate, inconsistent, and late or a combination of them. Timely and accurate information is important for all project participants as it forms the basis on which decisions are made and physical progress is achieved. Thus, information coordination is always the key factor leading to the success or failure of a construction project. The recommendation was to use internet as communication platform which can help information transfer effectively during the coordination process in construction.

To organize and manage a construction process successfully the coordinator must be a person with high attributes both technically and administratively, and has properly support training, it is essential that he is able to achieve the project objectives within time and cost using all his attributes to get good relationship with all construction parties (Iyer and Jha, 2005).

2.5 Job description and characterization for project coordinator

A job description is a list that a person might use for general tasks, or functions, and duties of a position. It may often include to whom the position reports, specifications such as the qualifications or skills needed by the person in the job, or a salary range. Job descriptions are usually narrative, but some may instead comprise a simple list of competencies; for instance, strategic human resource planning methodologies. A job description is usually developed by conducting a job analysis, which includes examining the tasks and sequences of tasks necessary to perform the job. The analysis considers the areas of knowledge and skills needed for the job. A job description usually includes several duties which need sufficient attributes .

A job description may include relationships with other people in the organization: Supervisory level, managerial requirements, and relationships with other colleagues. The job description needs to communicate clearly and concisely what responsibilities and tasks the job entails and to indicate, as well, the key qualifications of the job – the basic requirements (specific credentials or skills) – and, if possible, the attributes that underlie superior performance. Educational requirements and experience requirements are the areas where inadvertent discrimination may occur. Educational requirements must be a real necessity for the job .

A job description for coordinator in construction sets out the purpose of a coordinator, where the coordinator fits into the organization structure, the main accountabilities and responsibilities of the coordinator and the key tasks to be performed. It defines where the coordinator is positioned in the organization structure. Who reports to who. It provides essential information to potential recruits (and the recruiting team) so that they can determine the right kind of person to do the coordination. The job description forms an important part of the legally-binding contract of employment.

- **Duties**

The coordinator description should contain a list of the duties and responsibilities associated with the duties, along with the amount of time expected to be dedicated to each task. This should be represented as a percentage.

Descriptions of duties should be no more than two or three sentences in length and should be outcome-based; containing an action, an object and a purpose (eg ‘compiles monthly reports to allow monitoring of the department’s budget.’)

The list of duties and responsibilities will vary in length, but as a rule, should be as short as possible, otherwise the document becomes an operational manual rather than a job description.

- **Skills and competencies**

Skills and competencies should be listed separately from each other, as they are two quite separate things. Skills are activities the candidate can perform based on what they have learned in the past, or from qualifications they have obtained. Competencies are the attributes expected to be the candidate to display in the role.

An example of coordinator skills is the ability to give effective planning and scheduling. It is a skill that can be learned through study and practice. An example of a competency, on the other hand, is strong communication, which is an innate characteristic displayed by a person. The modern trend towards competency-based job descriptions means extra weight is given to behavioral competencies such as leadership, teamwork, flexibility, communication and initiative.

2.6 The coordination in construction industry in Gaza Strip

Due to the current economic downturn and unstable situation in Gaza Strip, with very critical political situation, all live facilities were affected especially the construction materials availability and prices which affect directly the construction industry progress, and make the coordination process more critical (Abdal-Hadi, 2010; Wikipedia, 2011).

In the Gaza strip there are constraints different from others country as economic and political conditions which made Gaza Strip as one of disorder regions. The problem in Gaza Strip, as one of the third world regions, is the lack of the natural resources, there are no internal and self-funds for development and improvement strategic projects. This suitable situation for external funds and foreign intervention, with their own goals and objectives, have a major influence on projects and leading directly to disputes, reworks,

variations and contribute in project time and budget overrun (Issam, 2002; Thabet, 2006).

Gaza Strip is experiencing at present many changes. Those appear in a result of accelerated social, economic and political development after the 2009 destructive war. Particularly noticeable is a boom in building activities and reconstruction works. Which include the housing, offices, and public facilities such as schools, hospitals and maintenance of existing building (Wikipedia, 2011).

The nature of coordination process performed in a construction project would vary from country to country, as the political and economic conditions change and developed. Accordingly, a different set of coordination activities will appear to satisfy the new construction requirements, using all management skills and the available facilities from the communication revelation (Thabet, 2006).

The coordination duties in the Gaza Strip have its own features, to consist with the nature of the local situation "economic, political, social and technological". However the lack of technological communication tools as email on transmission letters, site instructions and e-tendering of the new projects make the coordination process slower and more difficult. Construction process is heavily dependent on the effectively exchange of large and complex data and information. To ensure almost instant collaboration between parties involve in construction process, the difficulty on information exchange in Gaza Strip appear as main reason of poor quality, and sets sights on the coordination between construction industry parties as main managerial function in Gaza Strip construction industry (Abu Samra, 2006).

Thabet (2006) and Abdel – Aziz (2002) stated that, not only the poor quality but also the contractor's failure to completing with engineer's instructions and adverse attitudes against the contractor, is a direct result of poor cooperation and coordination between the contracting parties. They concluded that, continues coordination is the successful mystery in construction projects. However the continues coordination provide an optimum resource usage and least cost implementation.

In the Gaza Strip, it has been found that 90% of the observed firms of Abdel – Aziz (2002) sample have neither organizational form nor coordination system. In the absence of an organization and coordination, resources are wasted or underutilized. Therefore,

there is an insistent need to design a suitable coordination system. An effective coordination system in the Gaza Strip projects is urgently needed to improve control, reduce expected conflict, and good relationships built, which will increase the effectiveness of managerial staff.

Abu Samra (2006) studied coordination with information systems, and organizational procurement policies in the (MoLG) in the Gaza Strip, he concluded that, coordination affect the preparation of the annual operating budget of projects and services, monthly financial statements, which inflect the final status of the projects in terms of time and cost. Increasing coordination process in ministry of the local government with cooperation between all related departments on Gaza Strip municipalities is the main recommendation. Coordination will be to avoid any unexpected costs in the final completion of the project and to minimize the duplication of the works which waste the time and money.

Abdel – Aziz (2002) considered the factors affecting quality of building construction projects during the construction phase in Gaza Strip. The owner's level of coordination and input in the several stages of the construction project appeared as very important factor. Owner's contribution in the design and implementation process and the right decisions in the proper time will improve the quality of construction projects, and this right decisions proper will not be without continues coordination with all construction parties.

Thabet (2006) maintained that construction process in Gaza Strip, is heavily dependent on the effectively exchange of large and complex data. He introduced Information Technology (IT) lack in construction in the Gaza Strip as a reason of the weak and late coordination. Coordination with IT offered as solutions to the exchange data, and assure almost instant collaboration between parties involve in construction process using the new technological facilities in data and information exchange.

Othman (2004) tracked an infra-structure project implemented with partnership between The Ministry of Local Government (MOLG) and The UNDP, the project was implemented within the budget and the time frame as planned, except one variation order. There was a good relationship and coordination between the MOLG and UNDP, this good relationship and coordination were the direct reason of the success completion of the project and the remainder good relationship. The MOLG site engineer mentioned

that, the coordination status between the project team enabled them to solve all the problems, faced them during the implementation in a short period without any delay.

Medoukh (2008) during his study of tender documents the Ministry of Health (MOH) projects maintained that, the level of documents prepared for projects was unsatisfactory to execute the projects on time with acceptable level of quality. There was no coordination between the project parties, mainly the supervisor and owner. This was reflected on the negligence of accurate cost estimate which was prepared by the MOH. It should be noted that this estimate was not revised or discussed by the project parties before or during the bidding process. The scope of the works needed relatively higher coordination level as maintenance and rehabilitation works. Moreover, the beneficiary agency that will be responsible for project operation was not involved in bidding stage.

CHAPTER 3

**RESEARCH
METHODOLOGY**

3.1 Introduction

Research is an endeavor to discover a new or collate old facts, by the scientific study of a subject or by a course of critical investigation. Traditionally, the essential feature of research is that the work makes an original contribution to the knowledge. The methodology deals with the research design, population, data collection, questionnaire, validity, pilot study, and data analysis (Golafshani, 2003; Morse *et al.*, 2002).

Research in construction management field is a daunting one, for its complication and confusion, especially for which are associated with a project-oriented industry. In line with this and as stated in previous chapters, the main purpose of this research is to study the duties and attributes of project coordination in the Gaza Strip. Also it's important to consider the environmental variables, which may influence the results through their impacting on the data recorded (Mcnemar, 2005).

3.2 Research design

Research design needed to consider context to locate units of study more precisely in relation to the factors that potentially impact on the study. It is important to determine the scope of the work at the outset; the most common problem for a researcher is to greatly overestimate what is required of the work (Martyn, 2008; Morse *et al.*, 2002).

Designing a research study involves the development of a strategy that will guide the collection and analyses of data. This research consists of seven phases were illustrated as the methodology flow chart in Figure 4.1:

3.3 Approaches to data collection

After the type of data to be collected (quantitative) had decided, and the research approach (survey, case study) also had decided, the next step was to determine the technique for collecting the data (Golafshani, 2003; Morse *et al.*, 2002). The questionnaire will be the main approach to collect the data and perspectives of the respondents in addition to case study approach for deeply investigation (Martyn, 2008).

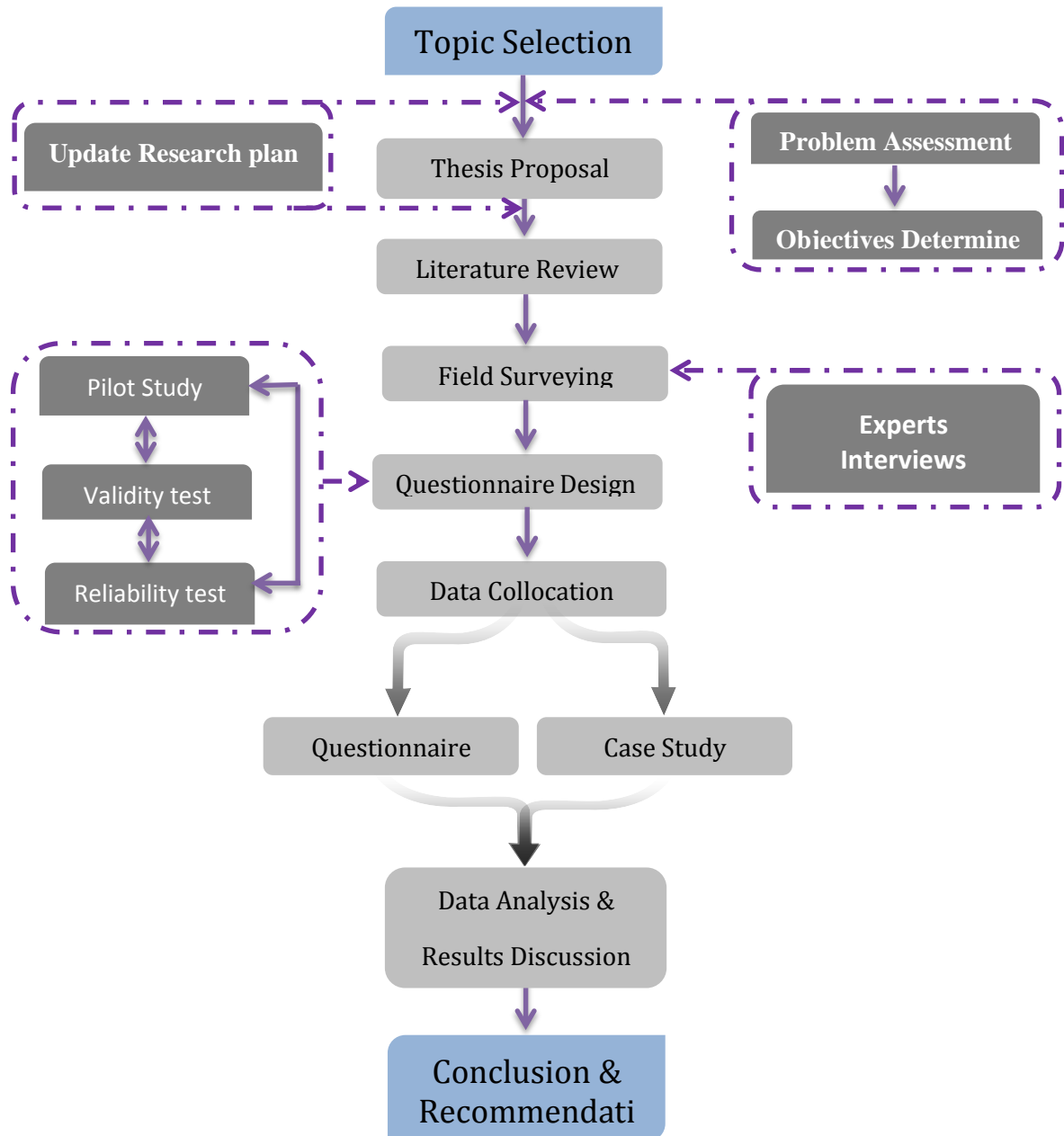


Figure 3-1: Flow Chart of Research Methodology.

3.3.1 Questionnaire approach

Questionnaire approach is used to gather data from a relatively large number of respondents within a limited time frame. It is concerned with a generalized. The questionnaire is probably the most widely used data collection technique for conducting surveys (Morse *et al.*, 2002).

Questionnaire approach was assigned for this study due to its advantages; it is suited to assembling a mass of information at a minimum expense in terms of finance, human and other resources. The bulk of the returns will probably be received within two weeks, if administered properly. However, some limitations can be overcome by personal interviews, continues followed up with the respondents, professionally designed and assure that the right person complete the questionnaire (Rothgeb, 2003).

3.3.2 The case study approach

Case studies encourage in depth investigation of particular instances within the research subject. The nature of the in depth data collection may limit the number of studies, when research is subject to time and resource constraints. Case studies may be selected on the basis of their representative with similar requirements to those used in statistical sampling to achieve a representative sample of all population, to demonstrate particular facets of the topic, or to show the spectrum of alternatives. Case study approach may combine with a variety of data collection methods (Morse *et al.*, 2002; Rothgeb, 2003). As the nature of the case study, focuses on one aspect of a problem, the conclusion drawn will not be generalized but, rather, related to one particular event. On the contrary, it provides an in depth analysis of a specific problem (Kelle, 2008).

3.4 Research period

The study started on June 2011 when the initial proposal was approved. The literature review was completed on the end of August 2011. The validity testing, piloting and questionnaire distribution and data collection took three months and completed on the beginning of December 2011. The entry, analysis and discussion of data finished on the end of January 2012. Conclusion and recommendation were completed on the end of February 2012. Documentation and editing were finished on the beginning of April.

3.5 Research population

In this research four populations were targeted. The first population is contractors from Palestinian Contractors Union (PCU) categories, which are classified under the building categories. These categories are "1st, 2nd, 3rd, Building categories" that have valid registration. The small categories (4th and 5th) were neglected due to the low practical and administrative experience of their companies in construction works. Based on the list of registered contractors at the PCU in December 2010, the size of population for the 1st, 2nd, 3rd, building categories was 140 companies.

The second population is donors. Unfortunately, there are no official reports showing the exact number of those organizations that work in construction projects in the Gaza strip specialty after the 2009 war. However, experts in Gaza stated that, the number of donation organizations which work in construction projects were 35 organizations.

The third population is owners, which includes; governmental ministries like Ministry of Education, Ministry of Health and Ministry of Housing and Public Works, non-governmental societies like universities, institutes and some especial centers for children and disables. There are no clear boundaries of this type of organizations number and the estimated number was 150 organizations.

The fourth population is consultants. The effective consultant offices in Gaza Strip are around 15 offices which work with local and international agencies in projects implementation.

3.6 Sampling

Selecting the research sample can take many forms, each of which is suitable to a particular situation. The term 'sample' means a specimen or part of a whole population which is drawn to show what the rest is like. In this research, selecting the research sample is very important, great care was given when choosing the sample. To ensure that, the characteristics of the sample are the same as its population and act as representative of the population as a whole. Usually, the means of drawing a representative sample is done randomly. The term 'random' means selecting subjects

(respondents) arbitrarily and without purpose. This type of sampling can be used when specifics about the characteristics of the sample are not essential, from the overall population selected. However, there are two main criteria that needed to be taking into consideration when selecting the sample. First, the information wants to be known. Second, the best source of information, referring to study purpose (Mcnemar, 2005).

3.6.1 Sample size

The sample is a part of total that represents the population. There are several approaches to determine the sample size. In this research, to determine the sample size for each population of contractors, donor, owner and consultant, Kish equation was used:

$$n = \frac{n'}{1 + \frac{n'}{N}}$$

The definitions of all variable can be defined as the following:

N: total population (140 contractors, 35 donors, 150 owners and 15 consultants).

n: sample size from finite population.

n': is the sample size from infinite population, which calculated from $[n' = S^2/V^2]$.

V: standard error of sample population equal 0.05 for confidence level 95%, $t=1.96$.

S²: standard error variance of population elements, $S^2= P (1-P)$; maximum at $P= 0.5$.

The sample size for the contractors and owners' population can be calculated from the previous equations as follows:

$$n' = \frac{S^2}{V^2} = \frac{(0.5)^2}{(0.05)^2} = 100$$

$$n_{contractors} = \frac{100}{1 + \frac{100}{140}} = 58 \text{ contractors}$$

$$n_{owner} = \frac{100}{1 + \frac{100}{150}} = 59 \text{ owners}$$

The sample size of donors and consultants was assigned to be 30 and 10 respectively, as they has small population. Although the sample size calculated for contractors is 58, the questionnaire was distributed to 77 contractors to overcome the risk of not responding from the respondents and to reflect higher reliability and benefits for the study. For the

same reason, 33 questionnaires were distributed for the donors, 75 questionnaires were distributed for the owners and 15 questionnaires were distributed for the consultants. Fortunately, the response rate was 92% for contractors and 91% for donors 92% for owners and 93% for consultants as shown in Table 3.1:

Table 3-1: Sample size and response rate of the study populations

Title	Number of needed questionnaires	Number of distributed questionnaires	Number of respondents	Response Rate
Contractors	58	77	71	92%
Donors	30	33	31	91%
Owners	59	75	69	92%
Consultants	10	15	14	93%
Total	150	200	184	92%

The follow up and good relation with respondents during the questionnaires distribution and collection process led to high rate of response as 92% of all samples categories. After all data entered on the SPSS software from the collected questionnaires there are some biased and uncompleted questionnaires. Five uncompleted questionnaire was deleted from the data. Four questionnaires from the data were excluded, which select the same choice for the all questionnaire factors. So that the final distribution of the data before the analysis illustrated in figure 3.1 below:

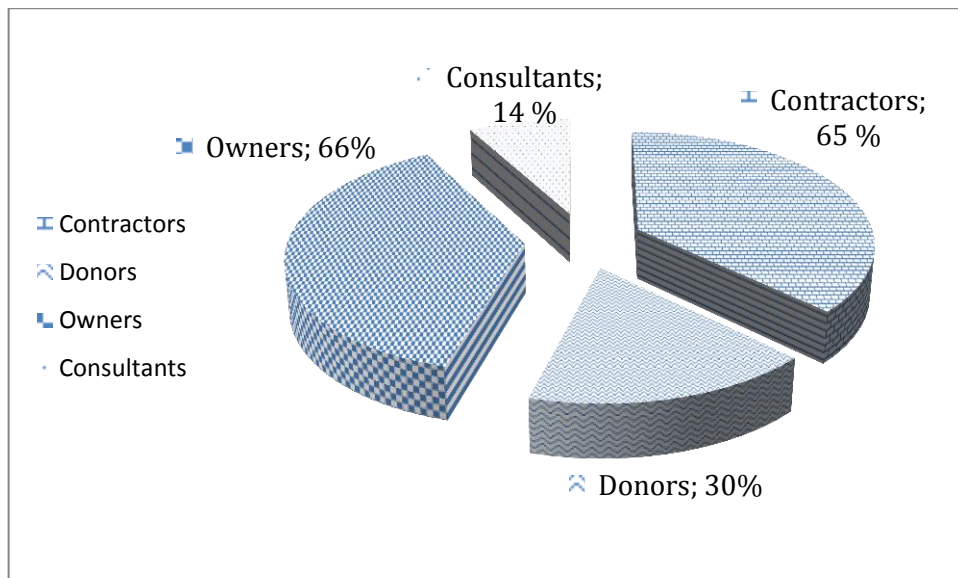


Figure 3-2: The final distribution of the 175 respondent's questionnaires

3.7 Questionnaire design

According to the literature review and after interviewing experts who are dealing with the subject of coordination at different levels, all information that could help in achieving the study objectives were collected, reviewed and formalized to be suitable for the study survey. After many stages of brainstorming, consulting, amending, and reviewing, a questionnaire was developed with closed questions.

The factors used in the questioners were identified from several previous studies, experts' interview, researcher experience, and recommendations from the supervisor. The questionnaire included an importance scale questions in all groups. These questions aim firstly to meet the research objectives, and to collect all the necessary data that can support the discussion, results and recommendations in the research.

The questionnaire comprised of three sections to accomplish the aim of the research. For section 1, there are eight questions related to respondents profile and his organization characteristics. Section 2, includes six groups were assigned to coordination duties. Section 3, consists of four groups for coordination attributes. Table 3.2 illustrates all questionnaire factors in second and third sections with its references:

Table 3-2: Questionnaire factors references

Section 2: Questions related to the duties of coordination:	
Group 2.1: Duties related to planning and scheduling	References
Contribute in plan preparing for project procurement, implementation and evaluation.	(Lin <i>et al.</i> , 2006)
Contribute in determination the duration of the project phases, and the overall duration.	(Merloa and Girard, 2004).
Prepare progress reports, and tracking all project phases as required.	(Jha and Misra, 2006).
Regular follow-up of work distribution to project participant, if done as plan.	(Mohsin <i>et al.</i> , 2009; Merloa and Girard, 2004)
Identify information "which must be known", to inform all construction participants parties with it.	(Jha and Misra, 2006; Lin <i>et al.</i> , 2006)
Identification of activities on critical path.	added
Arrange for kick-off meeting and review with all departments asking for date-wise schedule for their area of activities.	(Jha and Misra, 2006; Lin <i>et al.</i> , 2006)
Arrange project inputs like drawings, specifications and technical details on time for consistent execution.	(Mohsin <i>et al.</i> , 2009; Merloa and Girard, 2004)
Regular monitored of critical path activities for adhering to schedule.	added
Prepare a list of responsibilities to all parties involved in the project.	(Jha and Misra, 2006)
Coordinating and rescheduling the sequence of onsite work in case of changes in requirement from client side.	(Xue <i>et al.</i> , 2007)

Conduct regular meetings to review the project.	(Jha and Misra, 2006; Mohsin <i>et al.</i> , 2009)
Analyze the project performances on time, detecting variances from the schedule and dealing with their effects considering time.	(Jha and Misra, 2006; Xue <i>et al.</i> , 2007)
Keep joint records of owner-supplied materials along with their scheduled delivery dates and actual receipt date.	added
Keep joint records of adverse weather conditions and breakdown time of nonworking days.	(Mohsin <i>et al.</i> , 2009)
Arrange for timely carrying out of all tests for inspections and approval by the consultant.	(Xue <i>et al.</i> , 2007; Merloa and Girard, 2004)
Track handover of completed work (such as completed sections, finished parts of project for client use, etc.).	added
Contribute in determination of the variation orders duration.	added
Group 2.2: Duties related to resources management and team building	
Report resources deployment, and productivity etc. as done in the real implementation.	(Xue <i>et al.</i> , 2007)
Arrange all human resources and equipment's for compliance with site instructions/directives from the supervisor team.	(Xue <i>et al.</i> , 2007; Jha and Misra, 2006)
Revise ordering material accordingly, based on the project scheduling and the quantity in the storage, to be in time and minimize storage as possible.	added
Take care on the dimensions and shapes of the design items to be adequate with the standardized sizes and dimensions to minimize waste.	(Shen and Liu, 2003)
Minimize materials holding and transportation process as possible to reduced damages and loss in material "steel tiles".	(Shen and Chang, 2011)
Check the items dimensions and shapes before installation to prevent defect installation and rework.	(Merloa and Girard, 2004)
Quantifying waste in material and comparison the quantity, if within acceptable range or not to take corrective actions.	added
Care for works of others by making staff and workmen aware of their responsibilities.	(Xue <i>et al.</i> , 2007; Shen and Liu, 2003)
Identify appropriate human resources, materials and equipment for the project.	added
Proper tasks allocating to the available human resources for the project, to achieve the needed productivity.	(Xue <i>et al.</i> , 2007)
Arrange performance and technical training of human resources in the long term projects.	(Jha and Misra, 2006)
Spread the cooperation culture between employees.	(Xue <i>et al.</i> , 2007)
Spread delegation culture to appropriate project team especially on the site for quick decision.	(Merloa and Girard, 2004)
Ensure discipline among all employees, so everyone knows what he/she will do.	(Merloa and Girard, 2004)
Resolving differences/conflicts/confusion among participants.	(Jha and Misra, 2006)
Motivate project participants to achieve the planned productivity rate.	added
Develop a team spirit and accept suggesting input from all participants.	added
Establishing and maintaining an effective organizational structure.	(Jha and Misra, 2006)
Open a wide and fast communication channels between all parties "structure or un-structure".	added

Act as liaison between all constructions parties to facilitate the communication.	(Jha and Misra, 2006; Xue <i>et al.</i> , 2007)
Group 2.3: Duties related to contract implementation	
Check the implementation of all contractual commitments.	(Xue <i>et al.</i> , 2007)
Explain and support the work of nominated subcontractors and specialist suppliers, as in contract.	(Jha and Misra, 2006)
Identify or gather information on defects, deficiencies, ambiguities and conflicts in drawings and specifications and resolve them, within contract frame.	(Jha and Misra, 2006)
Improving and altering activities and considering better alternatives that efficiently meet the project contract constraints, as time, cost and quality.	(Lin <i>et al.</i> , 2006)
Provide an organized means for gathering information and compiling records as wariness from future claims.	(Xue <i>et al.</i> , 2007)
Keeping joint records of all drawings, amendments to contract, directives, correspondences, verbal instructions and documents received from the project participants.	(Jha and Misra, 2006; Lin <i>et al.</i> , 2006)
Keeping joint records of all input cost (viz. labor, material, plant, etc.) for non-tendered items to control the variations.	added
Act as liaison with specialist consultants, specialist subcontractors, nominated subcontractors, etc as in contractual relationship.	(Jha and Misra, 2006; Xue <i>et al.</i> , 2007)
Maintain proper contractual relationships with consultant and the contractor.	(Xue <i>et al.</i> , 2007; Merloa and Girard, 2004)
Contribute in determination the contractual relationship of the project as material and drawing approval responsibilities.	(Xue <i>et al.</i> , 2007)
Contribute in determination the responsible person for every party in project.	added
Contribute in determination the subtraction conditions of the project.	added
Contribute in variation orders approval, considering the other parties rights.	added
Contact outside authorities for logistic facilities as close road or stopping water supplies.	added
Group 2.4: Duties related to quality and performance	
Arrange carrying out of all tests for inspections by the supervision and maintaining records of the same.	(Xue <i>et al.</i> , 2007)
Arrange submission of materials samples for approval by the supervision, considering other parties.	(Xue <i>et al.</i> , 2007; Merloa and Girard, 2004)
Prepare a project quality plan assurance in line with contract specification.	(Jha and Misra, 2006)
Monitor quality level, and has a power to stop the defect works.	added
Propose remedial work methods and programs for executing in case of defect or damage.	(Xue <i>et al.</i> , 2007)
Follow up with offsite fabricators and their deliveries.	(Jha and Misra, 2006)
Contacting outside authorities for testing, inspection and results.	(Mohsin <i>et al.</i> , 2009)
Contribute in approval of quality measurement plan for all project stages.	added
Survey the updated materials available in the market to be ready for any plea from the contractor as unavailability.	added

Group 2.5: Duties related to budget and cash flow	
Contribute in determining the project objectives within budget limitation.	added
Find new alternatives for the same function with less cost.	added
Find new alternatives with higher specifications with small incremental cost.	added
Contribute in determination the budget of the project phases, and the overall budget.	added
Communicate financial status, documents and changes, etc., to all relevant participants.	(Jha and Misra, 2006; Lin <i>et al.</i> , 2006)
Monitoring the budget on all activities and taking corrective action.	(Merloa and Girard, 2004)
Keep joint records of quantities of work done especially of the work that is to be covered up.	(Xue <i>et al.</i> , 2007)
Keeping joint records of price escalations where the contract has escalation clause.	(Jha and Misra, 2006; Xue <i>et al.</i> , 2007)
Facilitating payments to own employees and subcontractors.	added
Make the payments consist with the work progress state, donor financial state and contractor liquidity.	(Merloa and Girard, 2004)
Determine or has a role in determination of the variation orders direct cost, and its effect on the overall budget.	(Jha and Misra, 2006)
Group 2.6: Duties related to health and safety:	
Consider safety regulations from design stage, to be safe during implementation.	(Skyler, 2008)
Contribute in preparing safety program for the project works implementation.	(Skyler, 2008; Saram and Ahmed, 2001)
Check the availability of personal protective equipment as needed in the site.	(Skyler, 2008)
Arrange and manage regular safety meeting.	added
Assign the dangers and hazard work tasks at the project beginning.	(Saram and Ahmed, 2001)
Monitor the application of all safety regulations related to dangerous works.	added
Prepare regular safety report from his monitoring.	Jha and Misra, 2006; Saram and Ahmed, 2001)
Take action in case of safety regulation violation.	(Jha and Misra, 2006; Saram and Ahmed, 2001)
Consider the safety requirements for subcontractor, owner and third party.	(Skyler, 2008; Saram and Ahmed, 2001)
Check the first aids tools availability and its readiness.	added
Section 3: Questions related to the attributes of coordinator	
Group 3.1: Attributes related to personal	
Has sharp charisma and independence in his decision.	(Jha and Iyer, 2006)
Always achieved deadlines for works handing over.	added
Has a physiognomy in his/her prediction	added
Respect the others opinions in spite the difference from his point of view.	(Jha and Iyer, 2006; Mohsin <i>et al.</i> , 2009)
Apologize when he/she has mistaken.	added

Forgive when the others mistake in the work.	added
Understand the others excuses in case of apologize.	added
Understand of human psychology, so he/she can deal with different culture.	(Xue <i>et al.</i> , 2007)
Concern for conciliation his/her direct supervisor and the top management.	(Jha and Iyer, 2006; Merloa and Girard, 2004)
Concern for other's ego, so he makes them feeling satisfied.	(Xue <i>et al.</i> , 2007; Jha and Iyer, 2006)
His/her age is in certain age group.	added
What the others say about him/her.	added
Has a diplomatic character.	(Jha and Iyer, 2006)
Group 3.2: Attributes related to technical	
His/her technical knowledge about the main subject of the work.	(Jha and Iyer, 2006)
His/her experience in the type of project works or nearest track.	(Merloa and Girard, 2004; Mohsin <i>et al.</i> , 2009)
Coordinate a previous project in the same type of the work.	added
His knowledge of project finance, taxes laws and budget limits.	added
Reliance on systematic approach, as a result of his deep technical knowledge.	(Merloa and Girard, 2004; Jha and Iyer, 2006)
Group 3.3: Attributes related to education and gained skills	
Has a civil engineering certification, planning, or a related field.	(Xue <i>et al.</i> , 2007)
Familiar with problem solving and gathering all opinions skills "duties and right.	added
Has liaison skill, with being attractive to the others and using all contact approach and communication skill professionally.	(Mohsin <i>et al.</i> , 2009; Lin <i>et al.</i> , 2006)
Cleverness planner with accurate result in case of forecasting.	(Jha and Iyer, 2006; Xue <i>et al.</i> , 2007)
Use analytical skills, as connect the results with reasons.	added
Has computer software's professionalism as "planning and scheduling software"	added
Group 3.4: Attributes related to coordination integrity	
His/her effect on the project completion status" cost, time and quality".	(Jha and Iyer, 2006)
His/her effect on the relationship between construction parties.	add
If the coordinator biased for party other than his employer.	(Xue <i>et al.</i> , 2007)
If the coordinator looking for working for party other than his current employer.	added
The employer violates the coordinator rights.	(Mohsin <i>et al.</i> , 2009)
If the coordinator feel unsatisfied on his current work from "money or respect".	(Merloa and Girard, 2004; Jha and Iyer, 2006)
The coordinator not just done his/her work, but he looks for improving and developing the work environment.	Mohsin <i>et al.</i> , 2009

The following is a detailed description of the final questionnaire content:

- 1) **Section one:** contained a general information about the population (contractor, donor, owner or consultant)
- 2) **Section two:** was related to the duties of coordination in Gaza projects. This section mainly aimed to achieve the first, second and fourth objective that intend to identify and rank the most common duties of coordination in Gaza Strip, and to propose recommendations to improve the responsibilities of coordination. Its consist from six different groups
- 3) **Section three:** this section was about the attributes of coordination in Gaza projects. This section aimed to achieve the first, third and fourth objective achieved through four groups discussed all types of attributes to improve the selection of suitable project coordinator based on his attributes.

The final version of the questionnaire was designed in English language (attached in Annex 1), while the distributed version was in Arabic language (attached in Annex 2), since the Arabic language is much effective and easier to be understood to get more realistic results as it's the native language of the respondents.

3.8 Pilot study

Pilot study provides a trial run for the questionnaire, which involves testing the wording of the question, identifying ambiguous questions, measuring the effectiveness of the standard invitation to respondents, etc. So that a preliminary analysis may carried out to see whether the wording and format will present any difficulties when the main data are analyzed (Morse *et al.*, 2002).

After modifying the questionnaire according to the comments of the supervisor and before distributed the final questionnaire on the whole sample, a pilot study is accomplished and 12 copies of the questionnaire are distributed to four contractor, three donors, three owners and two consultants to fill them. The purpose of this step is to discover if the questions are well understandable or not, also to find out any problem that may raise in filling the questionnaire. From the pilot study it appears that questions are generally clear. However, it seems some owners and consultants find difficulties in understanding some questions. All the suggested modifications and comments were

discussed with the supervisor before taking into consideration. Therefore, the researcher modifies these questions to be clearer. The piloting stage served to increase the effectiveness of the questionnaire. Items that had weak reliability were either deleted or combined. At the end of this process, the modifications are discussed with the supervisor, modifications and addition were introduced as well as the final form of the questionnaire was constructed then the questionnaire was finalized.

3.9 Validity of the research

Frequently, research is concerned with investigating a hypothesized causal relationship between factors to classified and to get the most important of them; if such a relationship is found, inferences are drawn about the population and, perhaps, a variety of circumstances in which the relationship may apply beyond those of the particular study carried out. This research involves a set of validities. They are described as construct, internal, statistical inference and external validities (Martyn, 2008; Morse *et al.*, 2002).

Poor construct validity occurs if the measurements are caused by other variables' influence or random noise. As validity refers to the degree to which an instrument measures what it is supposed to be measuring. High validity is the absence of systematic errors in the measuring instrument. When an instrument is valid; it truly reflects the concept it is supposed to measure. Validity has a number of different aspects and assessment approaches (Heffner, 2004; Golafshani, 2003).

To achieve good internal validity, care was in the research design such that alternative explanations were examined and appropriate methods selected by which the causality can be investigated. There are two approaches to evaluate instrument validity; content validity and statistical validity.

3.9.1 Content validity of the questionnaire

The amended questionnaire was reviewed by the supervisor and five experts in the coordination filed to evaluate the procedure of questions and the method of analyzing the results. The experts agreed that the questionnaire was valid and suitable enough to measure the purpose that the questionnaire designed for.

3.9.2 Statistical validity of the questionnaire

Statistically, to ensure the internal validity of the questionnaire factors; Spearman test was applied on 30 random sample from the questionnaires respondents. The test equation was:

$$r = \frac{1}{n} \sum \left(\frac{x - \bar{x}}{S_x} \right) \left(\frac{y - \bar{y}}{S_y} \right) \quad \text{Or}$$

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{n \sum x^2 - (\sum x)^2} \sqrt{n \sum y^2 - (\sum y)^2}}$$

Where:

\bar{x} : Arithmetic mean of the data x_1, x_2, \dots, x_n

\bar{y} : Arithmetic mean of the data y_1, y_2, \dots, y_n

S_x : The standard deviation of the data x_1, x_2, \dots, x_n

S_y : The standard deviation of the data y_1, y_2, \dots, y_n

r: correlation coefficient known as Pearson's correlation coefficient (Sequential).

The Spearman correlation coefficient of the most popular way to measure the correlation coefficient between two variables relative among themselves and there are several ways to calculate. when calculating the Spearman correlation coefficient its required to be the distribution of both variables equinoctial and the sample is random and the values of the individual does not depend on the values of another individual (Independent).

The test was calculated twice for this research; the first was to measures the Spearman correlation coefficients for each paragraph in the questionnaire. The results "Correlation Coefficient" of this test illustrate in Table 3.3. The correlation coefficients were calculated for all factors. It was found that the correlation coefficients were significant at $\alpha = 0.01$ and 28 degree of freedom, the coefficients must be greater than 0.463 and marked in Table 3.3 with (**) or $\alpha = 0.05$ and 28 degree of freedom the coefficients must be greater than 0.361 and marked in Table 3.3 with (*), as illustrated in Table 3.3. So that it can be said that these factors are consistent and valid to measure what they were set for. The second test was to measures the Spearman coefficient for each group in the questionnaire and each group with the total degree. The results "Correlation Coefficient" of this test illustrate in Table 3.4 below. The correlation coefficients were

calculated for all groups. It was found that the correlation coefficients were significant at $\alpha = 0.01$ and 28 degree of freedom the coefficients must be greater than 0.463 and marked in Table 3.4 with (**) or $\alpha = 0.05$ and 28 degree of freedom the coefficients must be greater than 0.361 and marked in Table 3.4 with (*), as illustrated in Table 3.4 so it can be said these factors are consistent and valid to measure what they were set for.

Table 3-3: The results of Spearman test for each paragraph

Correlation Coefficient										
No. ¹	Group ² 2.1	Group 2.2	Group 2.3	Group 2.4	Group 2.5	Group 2.6	Group 3.1	Group 3.2	Group 3.3	Group 3.4
1	**0.461	*0.434	*0.461	*0.394	**0.682	**0.698	**0.678	*0.364	**0.460	**0.891
2	*0.411	**0.522	**0.712	**0.585	**0.840	**0.699	*0.421	**0.718	**0.577	**0.822
3	**0.543	*0.384	**0.664	**0.548	**0.781	**0.762	**0.690	**0.626	*0.431	**0.902
4	**0.567	*0.428	**0.661	*0.443	**0.857	**0.790	**0.732	**0.767	**0.623	**0.761
5	**0.588	*0.367	**0.709	**0.684	**0.888	**0.599	**0.660	**0.485	**0.674	**0.751
6	**0.704	*0.381	*0.393	**0.670	**0.771	**0.540	**0.486		**0.740	**0.923
7	**0.592	*0.521	**0.694	**0.775	*0.423	**0.720	**0.600			
8	**0.522	**0.614	**0.528	**0.829	**0.617	**0.759	**0.606			
9	**0.730	**0.666	**0.501	**0.661	**0.629	**0.717	**0.521			
10	**0.598	**0.533	**0.624		**0.774	**0.503	**0.564			
11	**0.768	**0.713	**0.555				**0.608			
12	**0.623	**0.695	**0.517				**0.653			
13	**0.679	**0.672	**0.551							
14	**0.597	**0.551								
15	**0.557	**0.385								
16	**0.557	**0.522								
17	**0.770	**0.630								
18	**0.703	**0.595								
19		**0.581								

1: Number of factors of each group in questionnaire, the full text in Table 3.2.

2: The groups of each section in questionnaire, the full text in Table 3.2.

Table 3-4: The results of Spearman test for each group and total degree

Groups	Total degree	Group 2.1	Group 2.2	Group 2.3	Group 2.4	Group 2.5	Group 2.6	Group 3.1	Group 3.2	Group 3.3	Group 3.4
Group 2.1	0.881	1.000									
Group 2.2	0.758	0.564	1.000								
Group 2.3	0.796	0.791	0.433	1.000							
Group 2.4	0.808	0.720	0.668	0.634	1.000						
Group 2.5	0.749	0.667	0.437	0.620	0.657	1.000					
Group 2.6	0.654	0.585	0.394	0.553	0.362	0.457	1.000				
Group 3.1	0.568	0.342	0.372	0.309	0.445	0.259	0.283	1.000			
Group 3.2	0.585	0.327	0.422	0.265	0.364	0.389	0.444	0.661	1.000		
Group 3.3	0.547	0.374	0.301	0.206	0.333	0.414	0.359	0.700	0.684	1.000	
Group 3.4	0.505	0.389	0.413	0.376	0.280	0.229	0.092	0.147	0.219	0.156	1.000

3.10 Reliability of research

The idea behind reliability is that any significant results must be more than a one off finding and be inherently repeatable. Reliability can be equated with the stability, consistency, or dependability of a measuring tool (Martyn, 2008).

Researchers must be able to perform exactly the same experiment, under the same conditions and generate the same results. This will reinforce the findings and ensure that the wider scientific environment will accept the hypothesis. Without this replication of statistically significant results, the research has not fulfilled all of the requirements of testability. Generally, it is reasonable to assume that the instruments are reliable and will keep true and accurate time. However, diligent scientists take measurements many times, to minimize the chances of malfunction and maintain reliability. At the other extreme, any experiment that uses human judgment is always going to come under question (Golafshani, 2003; Mcnemar, 2005).

It is difficult to return the scouting sample of the questionnaire that is used to measure the questionnaire validity to the same respondents due to the different work conditions to this sample and time consuming. Therefore Half Split Method and Cronbach's Coefficient Alpha test were applied to the scouting sample in order to measure the consistency of the questionnaire.

3.11 Half split method

This method depends on finding Pearson correlation coefficient between the means of odd questions and even questions of each group of the questionnaire. Then, correcting the Pearson correlation coefficients can be done by using Spearman Brown correlation coefficient of correction. For unequal half groups Jetman correlation coefficient was used and marked in Table 3.5 with (*). The normal range of corrected correlation coefficient is between 0.0 and + 1.0 As shown in Table 3.5 below, all the corrected correlation coefficients values are between 0.0 and +1.0 and the significant (α) is less than 0.01 so all the corrected correlation coefficients are significance at $\alpha = 0.01$. It can be said that according to the Half Split method, the dispute causes group are reliable.

Table 3-5: Half Split Method coefficient

Groups	No. of factors	Coefficient before correcting	Coefficient after correcting
Group 2.1	18	0.688	0.815
Group 2.2	*19	0.557	0.559
Group 2.3	*13	0.475	0.476
Group 2.4	*9	0.799	0.812
Group 2.5	10	0.625	0.769
Group 2.6	10	0.571	0.727
Group 3.1	12	0.559	0.717
Group 3.2	*5	0.420	0.432
Group 3.3	6	0.366	0.536
Group 3.4	6	0.856	0.922
Total degree	108	0.811	0.896

3.12 Cronbach's coefficient alpha

This method is used to measure the reliability of the questionnaire between each group and the mean of the whole groups of the questionnaire. Cronbach's alpha is designed as a measure of internal consistency, that is, do all items within the instrument measure the same thing. Alpha typically varies between 0 and 1. The closer the Alpha is to 1, the greater the internal consistency of items in the instrument being assumed (George and Mallery, 2003).

Cronbach's Alpha can be written as a function of the number of test items and the average inter-correlation among the items. Below, for conceptual purposes, the formula for the standardized Cronbach's alpha shown below:

$$\alpha = \frac{kr}{1+(k-1)r}$$

Where:

K: is equal to the number of items;

r :is the average inter-item covariance among the items.

From this formula, if the number of items was increased, Cronbach's alpha increased. Additionally, if the average inter-item correlation is low, alpha will be low. As the average inter-item correlation increases, Cronbach's Alpha increases. This makes sense intuitively - if the inter-item correlations are high, and then there is evidence that the items are measuring the same underlying construct. This is really what is meant when saying there are "high" or "good" reliability.

The normal range of Cronbach's coefficient alpha value between 0.0 and + 1.0, and the higher values reflects a higher degree of internal consistency. Table 3.6 shows the values of Cronbach's Alpha for each grouped of the questionnaire and the entire questionnaire. Thereby, it can be said that the researcher proved that the questionnaire was valid, reliable, and ready for distribution for the population sample.

Table 3-6: Cronbach's Alpha for each group of the questionnaire and overall questionnaire

Groups	No. of factors	Cronbach's Coefficient Alpha
Group 2.1	18	0.902
Group 2.2	19	0.859
Group 2.3	13	0.832
Group 2.4	9	0.806
Group 2.5	10	0.899
Group 2.6	10	0.871
Group 3.1	12	0.829
Group 3.2	5	0.554
Group 3.3	6	0.611
Group 3.4	6	0.918
Total degree	108	0.962

3.13 Variance and errors

Variance is a numerical index of the variability in a set of data. Confound variance (systematic variance) is that portion of the variance in participants' scores that is due to extraneous factors that differ between the groups of participants and should be eliminated as far as possible. Experimental control refers to eliminating or holding constant extraneous factors that might affect the outcome of the study. Confounding occurs when something other than the independent variable differs in a systematic way and impacts on the results (Martyn, 2008; Golafshani, 2003).

The research is internally valid when it eliminates all potential sources of confound variance. When the study has internal validity, a researcher can confidently conclude that observed differences are due to variation in the independent variable. In this research all disturbed data was deleted from the data before analysis, so that there aren't any variance and errors in the results as proving by the previse statistics tests.

3.14 Data processing and analysis

Analysis is an interactive process by which answers to be examined to see whether these results support the hypothesis underlying each question or not. Raw data collocation was first sorted, edited, coded and then entered into computer software. Two programs were used, the Excel sheet and SPSS software. Appropriate graphical representations and tables were obtained to understand and analyze the questions. The ordinal scale was used in the analysis process. The ordinal scale is a ranking or rating data which normally uses integers in ascending or descending order.

The relative importance index (RII) was used in the analysis in addition to other approaches such as frequencies and percentiles and factor analysis technique. Quantitative statistical analysis for questionnaire was done by using Statistical Package for Social Sciences (SPSS 19)

3.15 Statistical procedures

To achieve the research goal, researcher used the Statistical Package for the Social Sciences (SPSS 19) for manipulating and analyzing the data. Statistical analysis for questionnaire was done by using SPSS as follows:

- Defining and coding of variables.
- Summarizing the data on raw data sheet.
- Entering data.
- Cleaning data from noisy.

After the above mentioned steps have been completed, the descriptive statistic method has been utilized. It either analysis is the responses in percentages, or contains actual numbers. This program was chosen because its flexibility in use accuracy in results.

3.15.1 Normal distribution test

In order to recognize whether or not the data obtained by the questionnaire can be categorized under the normal distribution, the Normal Distribution Test (Kolmogorov-Smirnov) was used to decide which type of statistical tests can be used to analyze the collected data either by the parametric tests or the non-parametric tests. Results of the test as shown in Table 3.7, clarifies that the significance level calculated are greater than 0.05 (sig. > 0.05), this in turn denotes that data follows normal distribution pattern, and so parametric test must be used.

Table 3-7: One-Sample Kolmogorov-Smirnov Test

No.	Section Contents	Kolmogorov-Smirnov Z	Asymp. Sig. (2-tailed)
1	Coordination duties	0.723	0.672
2	Coordination attributes	0.653	0.788
3	Total	0.703	0.707

3.15.2 The relative importance index

The relative index technique has been widely used in construction research for measuring attitudes with respect to surveyed variables. Several researches such as; Iyer and Jha, 2005, Jha and Misra (2006), Mohsin et al. (2009), and Hossain (2009) used the relative importance index in their studies of coordination issues. Likert scaling was used for ranking questions that have important levels. The respondents were required to rate the importance of each factor on a 5 point Likert scale using 1 for not important, 2 for of little importance, 3 for somewhat important, 4 for important and 5 for very important. Then, the relative importance index was computed using:

$$\frac{\sum w}{AN} = \frac{5 n_{5+} + 4 n_{4+} + 3 n_{3+} + 2 n_{2+} + 1 n_1}{5N}$$

Where:

W: is the weighting given to each factor by the respondent, ranging from 1 to 5,

n_1 = number of respondents for not important,

n_2 = number of respondents for little importance,

n_3 = number of respondents for somewhat important,

n_4 = number of respondents for important,

n_5 = number of respondents for very important.

A: is the highest weight (i.e. 5 in the study)

N: is the total number of samples (175 questioners).

The relative importance index ranges from 0 to 1, a full details table for relative important index available on the next chapter of all questionnaire factors.

3.15.3 Factor analysis

Factor analysis is a statistical method used to describe variability among observed variables in terms of a potentially lower number of unobserved variables called factors. In other words, it is possible, that variations in three or four observed variables mainly reflect the variations in a single unobserved variable, or in a reduced number of unobserved variables. Factor analysis searches for such joint variations in response to

unobserved latent variables. The observed variables are modeled as linear combinations of the potential factors, plus "error" terms. The information gained about the interdependencies between observed variables can be used later to reduce the set of variables in a dataset. Factor analysis originated in psychometrics, and is used in behavioral sciences, social sciences, management, operations research, and other applied sciences that deal with large quantities of data (DeCoster, 1998; Brown, 2009).

3.15.4 Exploratory factor analysis (EFA)

EFA is used to uncover the underlying structure of a relatively large set of variables. The researcher's a priori assumption is that any indicator may be associated with any factor. This is the most common form of factor analysis. There is no prior theory and one uses factor loadings to intuit the factor structure of the data (DeCoster, 1998).

The researcher's a priori assumption is that each factor (the number and labels of which may be specified) is associated with a specified subset of indicator variables. A minimum requirement of factor analysis is that one hypothesizes beforehand the number of factors in the model, but usually researcher posit expectations about which variables will load on which factors. The researcher seeks to determine, for instance, if measures created to represent a latent variable really belong together (DeCoster, 1998).

For new researches without any previous knowledge of its data, it is reasonable to use an EFA to generate a theory about the constructs underlying data measures and obtained the accurate results from the data, but this must be done using separate data sets. The data may be fitted merely (and not testing theoretical constructs). Exploratory factor analyses was applied on the questionnaires groups factors through the results to classified the duties and attributes for coordination to obtained the most critical factors in this issue and draw the milestone of its classes (DeCoster, 1998).

3.15.5 Kaiser Meyer Olkin (KMO)

Kaiser-Meyer-Olkin (KMO) test measures sample adequacy for factor analysis, provides an index (between 0 and 1) of the proportion of variance among the variables that might be common variance (i.e., that might be indicative of underlying or latent common factors). SPSS includes this statistical test application to help researchers in assessing the adequacy of their correlation matrices for factor analysis. Sample adequacy predicts whether the data you have collected are likely to "factor well" based on correlation and partial correlation and this is measured by the KMO statistic.

Kaiser had refined the index further and suggested that anything in the 0.90s was 'marvelous', in the 0.80s 'meritorious', in the 0.70s 'middling', in the 0.60s 'mediocre', in the 0.50s 'miserable' and below 0.5 'unacceptable'. The following are the KMO statistics for a number of matrices which considered using for factor analysis. As shown in Table 3.8 the KMO results were illustrated, all groups were more the 0.7 in KMO results. These results give the researcher trust to apply factor analysis and obtained a high confidence of the results.

Table 3-8: KMO test results and its scale

Groups	No. of factors	KMO results	Scale
Group 1.1	18	0.823	meritorious
Group 1.2	19	0.817	meritorious
Group 1.3	13	0.853	meritorious
Group 1.4	9	0.780	middling
Group 1.5	10	0.819	meritorious
Group 1.6	10	0.877	meritorious
Group 2.1	12	0.739	middling
Group 2.2	5	0.748	middling
Group 2.3	6	0.746	middling
Group 2.4	6	0.7	middling

3.15.6 Factor Extraction

The factors are extracted based on the fundamental theorem of factor analysis which says that every observed value can be written as a linear combination of hypothetical factors. The base of factors is chosen in a way that the base vector is an element which

is most responsible for occurring variances. The components are sorted according to their contribution to the variance (DeCoster, 1998).

3.15.7 Factor rotation

Factor Rotation can be defined as a procedure in which the eigenvectors (factors) are rotated in an attempt to achieve simple structure (Altmann, 2009). Principal components analysis is commonly used in factor analysis, and involves generating linear combinations of variables through factor analysis so that they explain as much of the variance present in the collected data as possible. Such analysis summarizes the variability of the observed data via a series of linear combinations of factors. Variance maximization (Varimax) is an orthogonal rotation of the factor axes to maximize the variance of the squared loadings of a factor (column) on all the variables (rows) in a factor matrix, which has the effect of differentiating the original variables by extracted factor. Each factor will tend to have either large or small loadings of any particular variable. This is the most commonly used method of orthogonal rotation. This is the default setting in most statistical programs. An assumption was made initially, that any indicator may be associated with any factor, to assign the best cluster numbers, the best factor loadings and the best rotation techniques, several trials of combination between the prewise parameter using Statistical Package of Social Science (SPSS). The number of cluster was three, factor loadings less than 0.3 have not been displayed and to be suppressed. Varimax rotation was assigned to be applied on the rotation process, which produces the best solution.

3.15.8 Interpretation of clusters

After all statistical process done, the factors which loaded on different clusters come out from SPSS was identified by assigned the factors groups with best loading and its effects on coordination process.

Full details of factor analysis process of questionnaire factors available in the next chapter.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

The aim of this study is to identify the duties and attributes of coordination in the construction projects in the Gaza Strip. This chapter introduces and discusses the results that have been deduced from a field survey of 185 questionnaires distributed to donors, owners, implementing agencies, consultants and contractors in the Gaza Strip.

The first part of this chapter illustrates the population characteristics results which describe the respondent's organizational profile, implemented projects and their monetary values, in addition to the respondent's educational level and experiences.

The second part focuses on the coordination duties questionnaire results during the project life cycle from the planning, all the way to the final evaluation and feedback process. This part was divided into six groups, these are: contract implementation duties group, quality and performance duties group, planning and scheduling duties group, health and safety duties group, budget and cash flow duties group and resources and team management duties group.

The third part illustrates the coordination attributes. This part was divided into four different groups of attributes, these are: personal attributes group, technical attributes group, education and gained skills and coordination integrity.

4.2 Population characteristics results

The sample of this research was selected to cover the study population of various parties of construction projects which include; owners, donors, implementing agencies, consultants and contractors. This section includes eight questions concerning the nature of the respondent who fill the questionnaire and his organization; position, years of experience, educational level, type of organization and its field of work, number of employee, number of implemented projects and the size of projects.

4.2.1 Respondents profile

The results of the respondent's profiles were illustrated in Table 4.1. Respondent's position results show that, the most respondents were site engineers, because this position is the most common in the Gaza Strip construction projects. The least number of respondents were project coordinators. This might be attributed to the fact that, not every project has this new position in the Gaza Strip construction projects.

The results of respondents experience illustrate that, most respondents' have more than 11 years of experience in construction work. This large number of experts who filled the questionnaire gives the researcher the trust of the result and insures the accuracy of the information. The results of respondent's educational level show that, most respondents have at least Bachelor's (B.Sc.) degree in engineering, because this educational degree is the most common between Gaza Strip engineers.

Table 4-1: Respondent's profiles frequency and percent

Profile alternatives	Frequency	Percent (%)
Position of respondent in organization		
Project manager	49	28.00
Project coordinator	21	12.00
Site engineer	67	38.29
Office engineer	38	21.71
Years of experience of respondent(years)		
From 1 to less than 3	37	21.14
From 3 to less than 5	28	16.00
From 5 to less than 10	49	28.00
More than 11	61	34.86
Degree or education of respondent		
B.Sc.	129	73.71
Master	44	25.14
Others	2	1.14

4.2.2 Organization profile

The results of the organization profile were illustrated in Table 4.2. The largest group of the respondents in the sample was working in the private sector as contractors. This represents 38.29 % from the total sample. The results concerning the organization work show that, owners group was the largest party and represents 37.71 % of the sample. The number of employees in the organization results illustrate that; the largest part of the sample has more than 15 employees, which gives the researcher an indicator that the majority of the sample was from the largest organization in construction industry, whom have a good knowledge and practice of coordination.

Table 4-2: Respondent's profiles frequency and percent

Profile alternatives	Frequency	Percent (%)
Organization type		
Governmental	21	12.00
Non-governmental NGO	23	13.14
International	46	26.29
Municipality	10	5.71
University	8	4.57
Private Sector	67	38.29
Organization work		
Donor	30	17.14
Owner	66	37.71
Contractor	65	37.14
Others	14	8.00
Number of employees in the organization		
Less than/equal 5	5	2.86
6-10 employee	23	13.14
11-15 employee	24	13.71
More than 15 employee	123	70.29
Number of executed projects in the organization		
Less 5 Projects	19	10.86
5-10 Projects	31	17.71
11-20 Projects	30	17.14
More than 20 Project	95	54.29
Work volume executed projects in organization		
Less than 1 million \$	15	8.57
1 –3 million \$	18	10.29
More than 3 -5 million \$	32	18.29
More than \$5 million	110	62.86

The number of implemented projects in the organization in the last three years (as the construction bloomed again in last three years) shows the real work size in the

organization with other construction parties. Those organizations with large work size needed to the coordination, to control the projects sequence and how engage in coordination. The results show that, the largest group of the sample represent 54.29 % has more than 20 implemented projects. The work volume or the dollar value of the implemented projects in the last three years represents the weight of the organization in construction industry. The result illustrates that, the largest group of the sample which represent 62.86 % have more than 5 million \$ work value in last three years.

4.3 Coordination duties and responsibilities results

The objectives of this study are to identify coordination duties and attributes in the Gaza Strip construction projects. All coordination duties and responsibilities were analyzed in two tracks; firstly the relative importance of coordination duties groups as overall. The second was coordination duties in each group, in order to assign their relative important index; each of those analyses was illustrated in details below:

4.3.1 Coordination duties groups

Coordination duties were classified into six groups, these are: contract implementation duties group, quality and performance duties group, planning and scheduling duties group, health and safety duties group, budget and cash flow duties group and resources and team management duties group. The groups included 79 coordination duties which were identified and classified based on literature review, construction management experts and the researcher experience. The results of RII percent's shown in Figure 4.1:

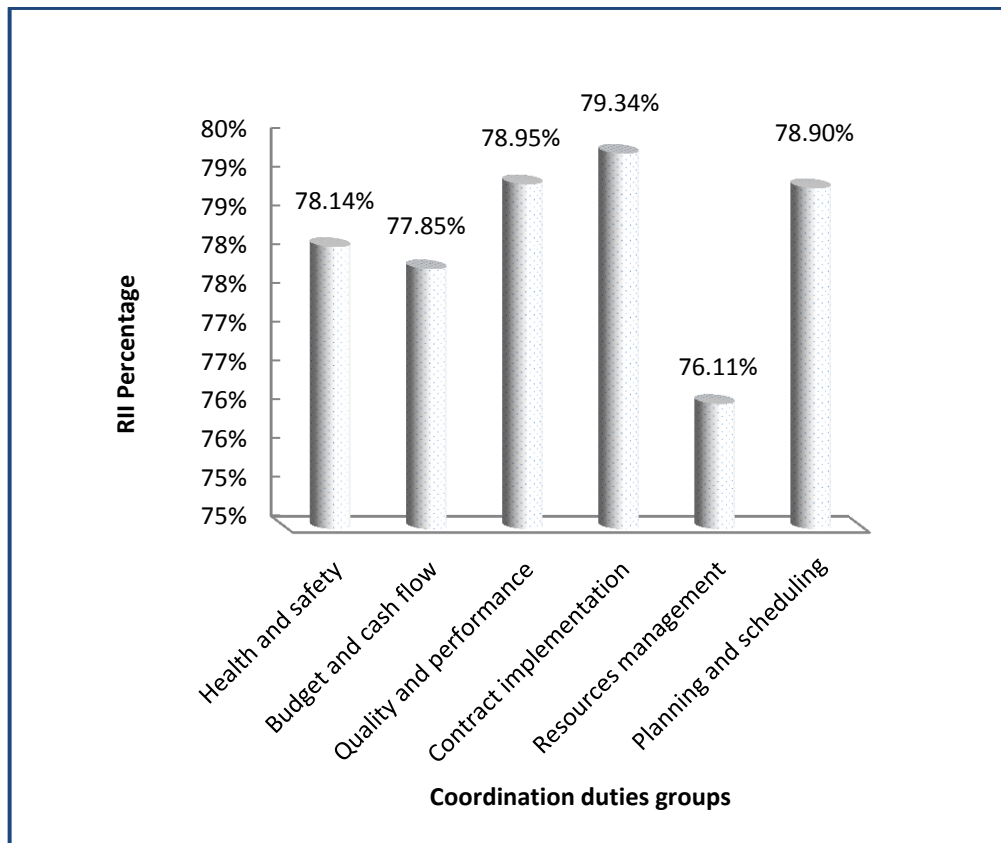


Figure 4-1: RII percent's of the coordination duties groups

Contract implementation duties group obtains the higher RII percent among all coordination duties groups with RII of 79.34 %. This group obtains the first rank; as the contract is the one who arrange the relation between stakeholders in construction projects. Since the contract implementation provides a clear description of each party duties and rights. Its importance represented by the prevention of the conflicts and disputes. The obtained results agree with Olson (2000) study, which confirmed on the contractual importance in construction industry. He recommended to improving the coordination techniques in contractual issues. Jha and Misra (2006), maintained that the contractual duties are one of the most important duties.

The second important group among the coordination duties groups is *the quality and performance duties group*, with RII of 78.95 %. This group determines and identifies quality level, quality assurance, quality measures and quality control from the early project development stages. The importance of this group is from the early coordination which is needed within the donor decided budget and the owner who ask for quality. The obtained results agree with Caldwell (2008) results, as the coordination duties for

quality in all stages in the project life cycle obtains high important degree. Also the strong relation observed between coordination effort and quality and performance.

Planning and scheduling duties group obtains the third order among the coordination duties groups with RII of 78.90 %. The degree of important of this group obtained from the time constraint on the project duration. This group deals with a very critical part, project planning and scheduling, which represent the unanimous path of project implementation on limited time frame, involved all project parties. The obtained results agree with Jha and Misra (2006) study, which maintained that, the planning and scheduling duties are one of the most important duties and obtains the second order of coordination duties groups' scale. Also, Choo (2003) mentioned that, the coordination during planning stage is critical in plan success and generate a generally accepted plan for the project execution.

Health and safety duties group scored the fourth position among the coordination duties groups with RII of 78.14 %. The importance of coordination in this critical group is, because of it's dealing with accidents and damages prevention. Consequently it's considering the safe constructability of the projects. Jha and Misra (2006) motion to the coordination safety duties, but not in separated group, and not appear within the highest important twenty duties. The explanation of this result is, that they have a safety engineer in there construction projects. In this case safety engineer deal with all issues related to safety, but in some cases the coordinator may deal with some of them.

Budgeting and cash flow duties group obtains RII of 77.85 %. Project coordinator must consider this group, in order to make consistency between the donor financial statuses and the owner needs and requirements to get the optimum value. The obtained results agree with Hongbin (2004), whereas the results mentioned that, the clear budget limitation from the beginning will defined the scope of the project. The coordination in this group allows the owner to propose the suitable need for this budget.

The final group of coordination duties is the **resource and team management duties group**; this group is related to the contractor nearer than the coordination team. The coordinator may do some of these group duties as a general directing for the project resources in order to achieve the project objectives. In arrangement of duties groups the resource management obtains RII of 76.11 %. The obtained results don't agree with Jha and Misra (2006), as they mentioned that the resource management duties group in coordination is the first group in their coordination duties group. This result is justified,

where the construction projects in Gaza Strip characterized with small to medium size. So that the volume of the heavy equipment's used doesn't very large in comparison with the international construction projects, where the important of this duties appear more critical.

In the following section, the most important factors of each group will be illustrated. Four factors with their RII will be discussed and compared with literates results.

4.3.1.1 Contract implementation duties group

In the Gaza Strip, construction projects have its special arrangements in the contractual issues. The multi-parties projects with donors, implementation agency, consultant, owner and contactor impose complicated contractual relations between them. In construction projects around four agreements will be signed. Agreement between the donor and implementation agency, agreement between the implementation agency and the owner, contract between the implementation agency and the consultant and the last is the contract between the implementation agency and the contractor (Jha and Misra, 2006). Consequently, to guarantee full success of the project, all the previous agreements must be formulated with coordination between all parties in the project context. The coordination of the agreements is a very complicated issue. The milestones of the agreements was determined by the top management, the coordination team must follow it up and sometimes modified it with the top management approval (Olson, 2000).

Thirteen contractual coordination duties were identified in the questionnaire to be ranked. All duties RII in this group rank are illustrated in Table 4.3:

The check/ follow up the implementation of all contractual commitments, was ranked by the respondents in the first position with RII of 87.09 %. The importance of this duty is from the conciliated role of coordination and the ability of early intervention at construction parties in case of any violation of agreement. The Gaza Strip unstable conditions make this duty very important. In Jha and Misra (2006) results this duty obtained RII of 61 % as there is a stable construction conditions and strategic planning for country needs.

Provide an organized information gathering and archives as wariness from future claims, this duty come in the second order according to respondents, with RII of 84 %. This duty has a critical influence after the project closure, in case of claim from any party to provide an organized documents archive. The obtained results agree with Olson (2000), as this duty obtained RII of 84 %, in claim prevention and solving coordination procedures. *Keeping joint records of all input cost for non-tendered items to control the variations* is the third duty according to respondents rank, with RII of 83.89 %, which deals with coordination of very confusion issue as variation orders. The obtained results agree with Jha and Misra (2006), as this duty appeared as one of the highest twenty duties with RII of 80 % since the variations management and archive appear strongly in their population. *The conflict in tender documents and it's solving in contractual frame* obtains the fourth order, with RII of 82.63 %. Conflicts would not be solved without coordination between project parties. This duty obtained RII of 81% in Jha and Misra (2006) study; also the tender documents improving appear as result of coordination.

Table 4-3: Contract implementation duties RII and rank

Contract Implementation Duties	RII	Rank
Check/ follow up the implementation of all contractual commitments.	87.09	1
Explain and support the work of nominated subcontractors and specialist suppliers from owner/ donor, as in contract.	76.91	11
Identify defects, deficiencies, ambiguities conflicts in tender documents "drawings/specifications..." and resolve them, within contract frame.	82.63	4
Improving and altering activities and considering better alternatives that efficiently meet the project contract constraints, as time, cost and quality.	78.29	6
Provide an organized information archives as wariness from future claims.	84.00	2
Keeping joint records of all input cost (viz. labor, material, plant, etc.) for non-tendered items to control the variations.	83.89	3
Act as liaison with specialist consultants, specialist subcontractors, nominated subcontractors, etc., as in contractual relationship.	77.49	7
Maintain proper contractual relationships with consultant and contractor.	77.03	10
Contribute in determination the contractual relationship of the project as material and drawing approval responsibilities during the implementation.	77.26	8
Contribute in determination the responsible person for every party in project "contractor, consultant, owner...."	78.97	5
Contribute in determination the subtraction conditions of the project.	74.97	13
Contribute in variation orders approval, considering other parties rights.	75.66	12
Contact outside authorities for logistic facilities as closing road or stopping water supplies.	77.26	9

4.3.1.2 Quality and performance duties group

All factors to achieve the quality assurance and quality measurements were illustrated in nine duties were listed in Table 4.4:

Arrange carrying out of all tests for inspections by the supervision/consultant and maintaining records of the results. This duty deal of quality measured and tests result obtained the first order according to respondents rank with RII of 83.2 %. The importance of this duty because of the involvement of all parties related during sampling, testing and results recording by coordination. The obtained results agree with Jha and Misra (2006), as this duty obtained the third order with RII of 80% between quality duties group. The second duty according to respondents rank is *monitoring the quality level, and the power to stop the defect works*, with RII of 81.92 %, which represent the quality alarm in the project. This duty corresponded to the second duty in Jha and Misra (2006), with RII of 82%. The third duty in this group according to respondents rank is *arranging submission of materials samples for approval by the supervision/consultant, considering other parties reservedly*, with RII of 87.26 %. This duty represent the actual work for approval, which usually done by coordinator, in order to involve the others interest in materials issues. In comparison with Jha and Misra (2006), this duty obtained the fourth order with RII of 78.5 %. In the fourth order according to respondents rank with RII of 80.46 % is, *follow up with offsite fabricators for any reason, if it's within the acceptable quality range*. This is the practical on site duty for the coordination and the observed of variation in the quality level. The obtained results agree with Olson (2000), where this duty was recommended for coordinator to justify the quality level variation.

Table 4-4: Quality and performance duties RII and rank

Quality and Performance Duties	RII	Rank
Arrange carrying out of all tests for inspections by the supervision/consultant and maintaining records of the results.	83.20	1
Arrange submission of materials samples for approval by the supervision/consultant, considering other parties reservedly.	81.26	3
Prepare a project quality assurance plan in line with contract specification.	78.86	5
Monitor quality level, and has a power to stop the defect works.	81.94	2

Quality and Performance Duties	RII	Rank
Propose remedial work methods and programs for execution in case of defects or damages.	78.29	6
Follow up with offsite fabricators for any reason, if it's within the acceptable quality range.	80.46	4
Contact outside authorities for testing, inspection and results.	74.97	9
Contribute in approval of quality measurement plan for all project stages.	75.43	8
Survey the updated materials available in the market to be ready for any contractor plea as unavailability/ closure.	76.11	7

4.3.1.3 Planning and scheduling duties group

This group of duties starts from the project beginning until the project closure. All duties related to the planning and scheduling duties are listed on Table 4.5:

The first duty in this group according to respondents rank is *the contribution in plan preparing for project procurement, implementation and tracking*, with RII of 89.87 %. Plan preparing is critical in the project success; however, in the planning process all parties must be included to take care for their consideration. The obtained result agreed with Choo (2003), as the coordination in plan preparing appeared in the highest important duties. *Prepare progress reports, and tracking all project phases as required*, is the second duty according to respondents rank with RII of 84 %. The coordinator reports represent the documentation archive of the projects, and the management eye on the project. It transfers the progress status to the management out of the site and future archive for review. The obtained results don't agree with Jha and Misra (2006), as this duty does not appear in the highest duties. This contrast was *raison d'etre* with, there was another engineer in their population dealing with reporting, as the large size of projects in respondent's context.

The third duty according to respondents rank is *the contribution in determination the project phase's duration, and the overall duration* with RII of 82.51 %. The coordination in duration's determination and time distribution of the project is critical within time constraints achievement in the Gaza Strip projects. The obtained results agree with Choo (2003), as the coordination of the duration assigned was in the most importance planning and scheduling duties. *Inform construction parties with all needed*

information to guarantee the time limitations achievement, this duty obtains the fourth order according to respondents rank with RII of 81.6 %. As informing process is one of coordination role in construction. This duty was included in Jha and Misra (2006) study, but did not obtain a high order in their result.

Table 4-5: Planning and scheduling duties RII and rank

Planning and Scheduling Duties	RII	Rank
Contribute in plan preparing for project procurement, implementation and tracking.	87.89	1
Contribute in determination the project phase's duration, and the overall duration.	82.51	3
Prepare progress reports, and tracking all project phases as required.	84.00	2
Regular follow-up of work distribution to project participant" design, tendering, supervision..., if done as plan.	78.51	13
Identify information "which must be known", to inform all construction parties with it "as dead lines'.	81.60	4
Identification of activities on critical path, regard its sensibility.	78.74	11
Arrange for kick-off meeting and review with all departments asking for date-wise schedule for their area of activities.	79.20	8
Arrange project inputs like drawings, specifications and technical details on time for consistent execution.	79.77	6
Regular monitoring of critical path activities for schedule updating according to actual.	79.20	9
Prepare a list of responsibilities to all parties involved in the project.	74.29	15
Reschedule the sequence of onsite work in case of changes in requirement from client side appear during implementation.	77.26	14
Conduct regular meetings to review the project, and minutes writing down.	79.31	7
Analyze the project performances on time, detecting variances from the schedule and dealing with their effects considering cash flow, and take corrective action.	78.63	12
Keep joint records of owner-supplied materials along with their scheduled delivery dates and actual receipt date.	71.43	18
Keep joint records of breakdown time of nonworking days due to adverse weather conditions and obstacles by donor/owner.	74.29	16
Arrange for timely carrying out of all tests for inspections and approval by the supervisor/consultant.	74.17	17
Track handover of completed work (such as completed sections, finished parts of project for client use, etc.).	79.20	10
Contribute in determination of the variation orders duration, to consider its effect on the others.	80.11	5

4.3.1.4 Health and safety duties group

Construction industry has a bad record in safety, therefore more care needed in this issue. Further coordination and cooperation are needed from the design stage and continues during implementation stage. *The early consideration of the safety regulations as considers from design stage*, this duty obtains the first order according to respondents rank with RII of 83.09 %. The early coordination creates safe design in execution stage.

The second duty according to respondents rank is *informing all related parties "donor, owner, insurance company..." in case of accidents*, with RII of 82.29 %. The exchange of information in accidents and all details are very important in the construction for future prevention and investigation. *Safety program preparing for the dangerous works implementation*, obtained the third order according to respondents rank with RII of 80.11 %. The importance of this duty, because the safety program is the plan for caution in the implementation stage which done by coordinator. *Availability of personal protective equipment as needed in the site*, obtained the fourth order according to respondents rank with RII of 79.54 %. The obtained result agreed with Jha and Misra (2006) results, as those duties appeared in the highest importance duties. All coordination duties related to health and safety issues illustrated in Table 4.6:

Table 4-6: Health and safety duties RII and rank

Health and safety duties	Percent	Rank
Consider safety regulations from design stage, to guarantee safe implementation.	83.09	1
Contribute in preparing safety program for the dangerous work implementation, especially risky works.	80.11	3
Check the availability of personal protective equipment as needed for the site team.	79.54	4
Arrange and manage regular safety meeting.	74.86	9
Assign the dangers and hazard tasks at the project beginning.	78.74	5
Monitor the application of all safety regulations related to dangerous works.	78.29	6
Prepare regular safety report from his/her monitoring.	69.14	10
Take action/quick decision in case of safety regulation violation.	78.06	7
Check the first aids tools availability and its readiness.	77.26	8
Inform all related parties "donor, owner, insurance" in case of accidents.	82.29	2

4.3.1.5 Budget and cash flow duties group

Budget is the early assigned money from the donor to cover the project costs. Cash flow is the way how this budget will be paid in the time frame. Table 4.7 illustrates budget and cash flow duties RII and rank.

The first duty according to respondents rank is, *monitoring cost of all activities and taking corrective action if needed to guarantee the cost constraints of the project*. This duty RII is 81.2 %, it's important due to cost constrain achieved and the ability of early stop of any extra costs. The obtained result agreed with Jha and Misra (2006) results, for cost monitoring and corrective actions with RII of 82 %. In spite of early determination of the project budget, the coordinator has to *harmonize the project objectives with assigned budget*. This duty obtained the second order according to respondents rank with RII of 81.14 %. Whereas coordinator familiar with others parties objectives, he can optimize the budget for their needs. The third duty according to respondents rank is *related to the variation order direct cost determination, and its effect on the overall budget*, with RII of 80.91 %. By this duty the coordinator insure the upper limit of the project cost and minimize the over budget probability. The obtained results agreed with Hongbin (2004), as the consistency between the objectives and the budget, obtained RII of 83 % and the control of the variation orders budget obtains RII of 87 %. *The coordination of cash flow of the budget* obtained the fourth order according to respondents rank with RII of 79.31%, where coordinator has the authority to accelerate or decelerate the project payments.

Table 4-7: Budget and cash flow duties rank

Budget and Cash flow Duties	Percent	Rank
Contribute in determining the project objectives within budget limitation.	81.14	2
Find new alternatives for the same function with less cost.	75.09	9
Find new alternatives with higher specifications with small incremental cost.	72.23	10
Contribute in the determination of the budget of the project phases, and the overall budget.	75.20	8
Communicate financial status, documents and changes, etc., to all relevant participants.	79.09	5
Monitoring cost of all activities and taking corrective action.	81.2	1

Budget and Cash flow Duties	Percent	Rank
Keep joint records of quantities of work done especially of the work that is to be covered up, for any disputes.	77.83	6
Facilitate payments to contractor and subcontractors	76.57	7
Make the payments consistent with the work progress state, donor financial state and contractor liquidity.	79.31	4
Contribute in determination of the variation orders direct cost, and its effect on the overall budget.	80.91	3

4.3.1.6 Resources and team management duties group

Resources management to obtain the assigned productivity rate is critical parameter in the project objectives achievement. The RII of resources and team management are illustrated in Table 4.8:

The coordination has its effect on the overall construction team, develop a team spirit and accept suggesting input from all participants' culture. This duty obtained the first order according to respondents rank with RII of 80.95 %, where the coordinator can deal with all level between construction parties. In construction industry *the confusions appear due to the complexity, resolving differences/conflicts/ confusion among participants*, obtained second order according to respondents rank with RII of 80.91 %. As this duty coordinate efficiently, the team spirit and the project objectives achievement implemented smoothly. This result agreed with Jha and Misra (2006), as this duty appeared in the most importance duties with RII of 80.5 %. *The motivation for project participants to achieve the planned productivity rate* obtained the third order according to respondents rank with RII of 81.49 %, since the coordinator can transfer the motivation feeling from the top management. The obtained results agreed with Jha and Misra (2006) results, in motivation form coordination duties with RII of 79.3 %. *Act as liaison between all construction parties to facilitate the communication*, was the fourth duty according to respondents rank with RII of 79.77 %. The importance of this duty come from communication gap exists in construction, since the coordinator play an effective role in reparation this gap.

Table 4-8: Resources management and team building duties RII and rank

Resources Management and Team Building Duties	Percent	Rank
Arrange/ distribute resources, tracking its effect on the productivity in the real implementation.	75.54	11
Arrange all resources and equipment's for on the project activates according to owner/donor priorities.	72.80	14
Revise ordering material accordingly, based on the project scheduling and the quantity in the storage, to be in time and minimize storage as possible.	72.00	17
Take care on the dimensions and shapes of the design items to be adequate with the standardized sizes and dimensions to minimize waste.	74.29	13
Minimize materials holding and transportation process as possible to reduced damages and loss in material "block tiles".	69.14	19
Check the items dimensions and shapes before installation to prevent defect installation and rework.	72.69	16
Quantifying waste in material and comparison the quantity, if within acceptable range or not to take corrective actions.	71.31	18
Care for works of others by making staff and workmen aware of their responsibilities.	75.20	12
Proper tasks allocating to the available human resources for the project, to achieve the needed productivity.	78.06	8
Arrange performance and technical training of human resources in the long term projects.	72.69	15
Spread the cooperation culture between employees.	76.80	9
Spread delegation culture to appropriate project team especially on the site for quick decision.	76.00	10
Ensure discipline among employees, so everyone knows what he/she will do	78.74	6
Resolve differences/conflicts/confusion among participants.	79.77	4
Motivate project participants to achieve the planned productivity rate.	81.49	3
Develop a team spirit and accept suggesting input from all participants.	80.95	1
Establishing and maintaining an effective organizational structure.	78.17	7
Open a wide and fast communication channels between all parties "structure or un-structure".	79.66	5
Act as liaison between all constructions parties to facilitate communication.	80.91	2

4.3.2 Factor analysis of coordinator duties

Factor analysis is an accumulation of statistic technics used to examine how underlying constructs influence the responses on a number of measured variables. Factor analysis was used to explore and detect the underlying relationships among the coordination duties. Those statistical techniques identify a relatively small number of factors that can be used to represent relationships among sets of variables (Chen and Chen, 2007). Factor rotation is the method to investigate the hypothesized structure of the loadings, which demonstrate that the loadings are not unique.

In this study, factor analysis was applied to explore the underlying constructs of the coordination duties in construction projects to classify them into suitable clusters. The classification was done in a series of steps. The set of factors loadings was calculated, which yields theoretical variances and covariance. It is customary to apply rotation to set of loadings that fit the observations equally well, but can be more easily interpreted. The goal is to make some of these loadings as large as possible, and the rest as small as possible (Shen and Liu, 2003).

The following is the factor analysis of each coordinator duties groups, with its loading and cluster identification:

4.3.2.1 Contract implementation duties factor rotation

The contract implementation duties were processed in factor analysis procedure, using extraction method with principal component analysis, by Varimax with Kaiser Normalization rotation method. The loading results from rotated component matrix of the three clusters are illustrated in Table 4.9:

After loading factor distributed between the three clusters, each duties cluster was investigated and interpreted as followed:

Cluster 1 included the issues of contract clauses, the nature of contractual relation, contact person, subtractions and variations approval. The emerging of subtractions and variations approval is the result of the relation between week contracts and variations. These factors were very close to each other's as all duties were high loaded. *Cluster 2* included the issues of illustrating the relation and disputes between stakeholders in

contractual documents. Where pre-conflicts proposed solution with coordination will reduce the conflicts impact. These factors were nearly close to each other's as all duties were medium loaded.

Cluster 3 included two of this group duties, which related to the issues of, provides an organized contractual information gathering and archives in the main tender or variation. The emerging of those two factors in the same cluster, because the good keeping joint records of information and documents provide an organized archive. These factors were very close to each other's as all duties were high loaded.

Table 4-9: Factor Rotation results between contract implementation duties

Contract Implementation Duties	Clus. 1	Clus. 2	Clus. 3
Check/ follow up the implementation of all contractual commitments.	0.558		
Explain and support the work of nominated subcontractors and specialist suppliers from owner/ donor, as in contract.		0.630	
Identify defects, ambiguities and conflicts in tender documents "drawings /specifications..." and having them resolved, within contract frame.	0.372	0.532	
Improving and altering activities and considering better alternatives that efficiently meet the project contract constraints, as time, cost and quality.		0.550	0.335
Provide an organized information gathering and archives as wariness from future claims.			0.901
Keeping joint records of all input cost (viz. labor, material, plant, etc.) for non-tendered items to control the variations.			0.882
Act as liaison with specialist consultants, specialist subcontractors, nominated subcontractors, etc., as in contractual relationship.		0.783	
Maintain proper contractual relationships with consultant and contractor.	0.439	0.632	
Contribute in determination the contractual relationship of the project as material and drawing approval responsibilities during the implementation.	0.631	0.427	
Contribute in determination the responsible person for every party in project "contractor, consultant, owner...."	0.793		
Contribute in determination the subtraction conditions of the project.	0.827		
Contribute in variation orders approval, considering other parties rights.	0.744		
Contact outside authorities for logistic facilities as closing road or stopping water supplies.		0.593	

4.3.2.2 Quality and performance duties factor rotation

The quality and performance duties were processed in factor analysis procedure. The loading results from rotated component matrix of the three clusters are illustrated in Table 4.10:

After the loading factor distributed between the three clusters, each duties cluster was investigated and interpreted as follows:

Cluster 1 included the issues of quality measures plan, fabrications and materials availability and approvals. The quality plan preparing required a wide knowledge of materials approval and availability. These factors were nearly close to each other's as all duties were medium loaded. *Cluster 2* included the issues of quality assurance and alternatives with higher quality. The remedial work methods proposed emerging as a solution of low quality level of execution. These factors were nearly close to each other's as all duties were medium loaded. *Cluster 3*, which related to the issues of, organized the tests and samples approval. Where each test in construction need coordination for representative sample submission and approval. These factors were very close to each other's as all duties were high loaded.

Table 4-10: Factor rotation results between quality and performance duties

Quality and Performance Duties	Clus. 1	Clus. 2	Clus. 3
Arrange carrying out of all tests for inspections by the supervision/ consultant and maintaining records of the results.			0.881
Arrange submission of materials samples for approval by the supervision/ consultant, considering other parties reservedly.			0.899
Prepare a project quality assurance plan in line with contract specification.		0.833	
Monitor quality level, and has a power to stop the defect works.		0.720	
Propose remedial work methods and programs for execution in case of defects or damages.	0.383	0.656	
Follow up with offsite fabricators for any reason, if it's within the acceptable quality range.	0.536	0.474	
Contact outside authorities for testing, inspection and results.	0.781		
Contribute in approval of quality measurement plan for all project stages.	0.775		
Survey the updated materials available in the market to be ready for any contractor plea as unavailability/ closure.	0.745		

4.3.2.3 Planning and scheduling duties factor rotation

Planning and scheduling duties were processed in factor analysis procedure. The loading results from rotated component matrix of the three clusters are illustrated in Table 4.11:

After the loading factor distributed between the three clusters, each duty in clusters was investigated and interpreted. *Cluster 1* included the issues of scheduling, progress, critical path monitoring and the milestones dates. The emerging of material supply, variations duration and non-working days are very influence on critical path duration. These factors were nearly close to each other's as all duties were medium loaded. *Cluster 2* included the issues of arrange project inputs, meetings and responsibilities within time frame. The emerging of those factors which deals with pre-contract stage, like pre-bid meeting. These factors were nearly close to each other's as all duties were medium loaded.

Cluster 3 included four duties of this group, which related to the issues of plans preparing, durations determine, reporting and comparison the actual with planed events. Follow up and progress tracking need coordination with well plan preparing. These factors were very nearly to each other's as all duties were medium loaded.

Table 4-11: Factor Rotation results between planning and scheduling duties

Planning and Scheduling Duties	Clus. 1	Clus. 2	Clus. 3
Contribute in plan preparing for project procurement, implementation and tracking.			0.702
Contribute in determination the project phase's duration, and the overall duration.	0.316		0.648
Prepare progress reports, and tracking all project phases as required.			0.578
Regular follow-up of work distribution to project participant" design, tendering, supervision..., if done as plan.		0.456	0.511
Identify information "which must be known", to inform all construction parties with it "as dead lines'.		0.697	
Identification of activities on critical path, regard its sensibility.	0.585		
Arrange for kick-off meeting and review with all departments asking for date-wise schedule for their area of activities.		0.747	
Arrange project inputs like drawings, specifications and technical details	0.311	0.639	

Planning and Scheduling Duties	Clus. 1	Clus. 2	Clus. 3
on time for consistent execution.			
Regular monitoring of critical path activities for schedule updating according to actual.	0.657		
Prepare a list of responsibilities to all parties involved in the project.	0.349	0.538	
Reschedule the sequence of onsite work in case of changes in requirement from client side appear during implementation.	0.696		
Conduct regular meetings to review the project, minutes writing down.	0.353		
Analyze the project performances on time, detecting variances from the schedule and dealing with their effects considering cash flow, and take corrective action.	0.612		
Keep joint records of owner-supplied materials along with their scheduled delivery dates and actual receipt date.	0.651		
Keep joint records of breakdown time of nonworking days due to adverse weather conditions and obstacles by donor/owner.	0.719		
Arrange for timely carrying out of all tests for inspections and approval by the supervisor/consultant.	0.634	0.361	
Track handover of completed work (such as completed sections, finished parts of project for client use, etc.).	0.321	0.520	
Contribute in determination of the variation orders duration, to consider its effect on the others.	0.577		0.424

4.3.2.4 Health and safety duties factor rotation

The health and safety duties were processed in factor analysis procedure, using extraction method with principal component analysis.

The loading results from rotated component matrix of the three clusters are illustrated in Table 4.12:

After the loading factor distributed between the three clusters, each duties cluster was investigated and interpreted. *Cluster 1* included the issues of monitoring and checks the safety regulations and its tools, to take action immediately in case of violation. These factors were nearly close to each other's as all duties were medium loaded.

Cluster 2 included the issues of safe design, safety program and equipment's. Emerge those factors as pre-execution for safety coordination and its final influence. These factors were nearly close to each other's as all duties were medium loaded.

Cluster 3 included the last one of these group duties, which related to the issues of informed of the related party in case of accident for future learning. This factor was very close to cluster as highly loaded.

Table 4-12: Factor Rotation results between health and safety duties

Health and safety duties	Clus. 1	Clus. 2	Clus. 3
Consider safety regulations from design stage, to guarantee safe implementation.		0.769	
Contribute in preparing safety program for the dangerous work implementation, especially risky works.		0.836	
Check the availability of personal protective equipment as needed for the site team.		0.794	
Arrange and manage regular safety meeting.	0.675	0.342	
Assign the dangers and hazard tasks at the project beginning.	0.313	0.551	0.529
Monitor the application of all safety regulations related to dangerous works.	0.715	0.405	
Prepare regular safety report from his/her monitoring.	0.857		
Take action/quick decision in case of safety regulation violation.	0.779		
Check the first aids tools availability and its readiness.	0.684		0.375
Inform all related parties "donor, owner, insurance company..." in case of accidents.			0.933

4.3.2.5 Budget and cash flow duties factor rotation

The budget and cash flow duties were processed in factor analysis procedure, using extraction method with principal component analysis. The loading results from rotated component matrix of the three clusters are illustrated in Table 4.13:

After the loading factor distributed between the three clusters, each duties cluster was investigated and interpreted. *Cluster 1* included the issues of cash flows, record the quantity of disputed works and variation cost influence on budget. The variation cost approval influences the cash flow and final cost. These factors were nearly close to each other's as all duties were medium loaded.

Cluster 2 included the issues of alternatives available to apply value engineering concept. Since less or the same cost assigns against higher quality or less execution time. These factors were very close to each other's as all duties were medium loaded.

Cluster 3 included duties related to the issues of budget determined, distribution and monitoring to cost control and inform all parties with financial status of the project. These factors were nearly to each other's as all duties were medium loaded.

Table 4-13: Factor Rotation results between budget and cash flow duties

Budget and Cash flow Duties	Clus. 1	Clus. 2	Clus. 3
Contribute in determining the project objectives within budget limitation.		0.503	0.524
Find new alternatives for the same function with less cost.		0.850	
Find new alternatives with higher specifications with small incremental cost.		0.827	
Contribute in the determination of the budget of the project phases, and the overall budget.		0.552	0.589
Communicate financial status, documents and changes, etc., to all relevant participants.			0.793
Monitoring cost of all activities and taking corrective action.			0.814
Keep joint records of quantities of work done especially of the work that is to be covered up, for any disputes.	0.501	0.436	
Facilitate payments to contractor and subcontractors	0.779		
Make the payments consistent with the work progress state, donor financial state and contractor liquidity.	0.819		
Contribute in determination of the variation orders direct cost, and its effect on the overall budget.	0.752		0.331

4.3.2.6 Resources and team management duties factor rotation

The resources and team management duties were processed in factor analysis procedure, using extraction method with principal component analysis. The loading results from rotated component matrix of the three clusters are illustrated in Table 4.14:

After the loading factor distributed between the three clusters, each duties cluster was investigated and interpreted. *Cluster 1* included the issues of technical training,

cooperation culture, motivation and conflicts solving. This cluster also deals with organization breakdown structure. Where the team spirit and wide cooperation will reduce the conflicts and motivate project participants. These factors were nearly close to each other's as all duties were medium loaded.

Cluster 2 included the issues of anticipation procedures to consider priorities in resources allocating and discipline and delegation culture. As tasks allocation provide a clear assigned for every employ responsibilities with acceptable margin of delegation. These factors were nearly close to each other's as all duties were minor loaded. *Cluster 3* included duties, which related to the issues of, arrange resources distribution and minimize the waste as possible. Where coordination in design process and good materials purchase order, will minimize materials holding and transportation process to reduce the waste. This factor was very close to cluster as highly loaded.

Table 4-14: Factor rotation results between resources and team management duties

Resources Management and Team Building Duties	Clus. 1	Clus. 2	Clus. 3
Arrange/ distribute resources, tracking its effect on the productivity in the real implementation.			0.813
Arrange all resources and equipment's for on the project activates according to owner/donor priorities.			0.838
Revise ordering material accordingly, based on the project scheduling and the quantity in the storage, to be in time and minimize storage as possible.			0.632
Take care on the dimensions and shapes of the design items to be adequate with the standardized sizes and dimensions to minimize waste.		0.385	0.654
Minimize materials holding and transportation process as possible to reduced damages and loss in material "block tiles".		0.413	0.667
Check the items dimensions and shapes before installation to prevent defect installation and rework.		0.668	0.425
Quantifying waste in material and comparison the quantity, if within acceptable range or not to take corrective actions.		0.583	0.366
Care for works of others by making staff and workmen aware of their responsibilities.	0.334	0.410	
Proper tasks allocating to the available human resources for the project, to achieve the needed productivity.		0.468	0.396
Arrange performance and technical training of human resources in the long term projects.	0.553		
Spread the cooperation culture between employees.	0.621	0.336	
Spread delegation culture to appropriate project team especially on the site for quick decision.	0.413	0.539	

Resources Management and Team Building Duties	Clus. 1	Clus. 2	Clus. 3
Ensure discipline among all employees, so everyone knows what he/she will do.		0.815	
Resolve differences/conflicts/confusion among participants.	0.547	0.498	
Motivate project participants to achieve the planned productivity rate.	0.467	0.460	
Develop a team spirit and accept suggesting input from all participants.	0.609	0.365	
Establishing and maintaining an effective organizational structure.	0.801		
Open a wide and fast communication channels between all parties "structure or un-structure".	0.761		
Act as liaison between all constructions parties to facilitate communication.	0.623		

4.4 Coordinator attributes and characteristics results

Coordination attributes and characteristics were reviewed and classified into four groups these are: personal attributes group, technical attributes group, education and gained skills group and coordination integrity group. The order based on its important in providing the required knowledge, abilities, and skills to qualified project coordinator to deal with every party in the project strongly. The analysis was done in two tracks; firstly the coordination attributes groups as overall. The second was in each group attributes, those analyses are illustrated in details in the following paragraph:

4.4.1 Coordination attributes groups

Coordination attributes become even more critical and must be well described with specific in construction, to facilitate the projects management process. In this part, 29 attributes and characteristics were identified and classified on the basis of a thorough review of available literature, some attributes were recommended from construction management experts and researcher experience. The RII results are shown in Figure 4.2:

The education and gained skills group was the first group in rank with RII of 83.01 %. This group represents the academic qualification and gained skills by training and practical courses. If the coordination team hasn't a strong academic qualification in

engineering, their performance will not be effective in construction projects. This qualification is the base of the coordination knowledge of the construction projects implementation sequence. The results agreed with Xue *et al* (2007) who emphasized that, the coordinator education and skills are decisive criterion in project success and the adequacy of coordination process.

The second group was technical attributes with RII of 82.26 %. Whereas, all previous experiences in the track of the project increase the technical attributes in term of the main items of the project and its related technics. This group of attributes appears from the initial technical feasibility and continues through the sequence of project implementation. The obtained results agreed with Jha and Iyer (2006) who found that, this group has an effective role in disputes and conflicts reduction during the coordination process, where the coordinator know and familiar with technical details.

Personal attributes was the group of the behaviors, conducts and actions occur according to the general thinking and believe. This important group of attributes obtained the third order with RII of 79.50 %. The general behaviors and attitude of the coordinator draw the nature of his relation with the others and affect considerably the daily progress and final completion of the project. The results agreed with Xue *et al* (2007) and Jha and Iyer (2006) who emphasized that, this group of attributes illustrate the personal features of the coordinator and reflect the nature of treatment culture in the project.

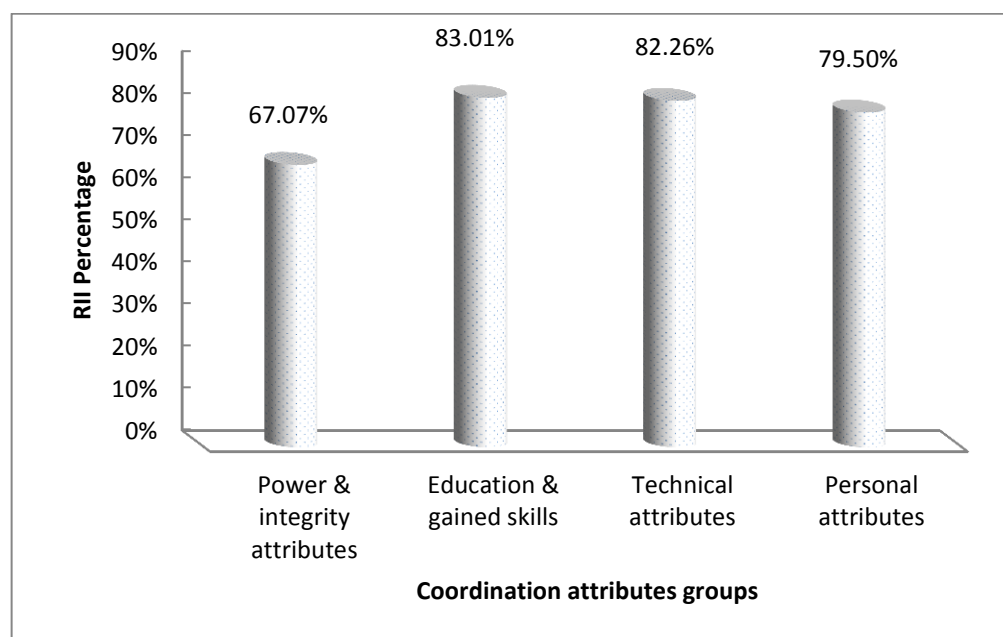


Figure 4-2: RII percent's of the coordination attributes groups

The final group of coordination attributes was integrity group with RII of 67.07 %. Since the integrity is an internal feeling consist from the general context of the project and how the coordinator realizes himself in this project. This important issue in coordination attributes reflects the level of satisfaction as a result of the project environment. The obtained results agreed with Merloa and Girard (2004), as those attributes does not obtained a high rank among the coordination attributes.

4.4.1.1 Education and gained skills group

The education and skills are the primary qualifications of coordinator. In construction projects coordination especial education and skills needed, six educational and gained skills attributes were proposed in the questionnaire to be ranked. All attributes RII and rank are illustrated in Table 4.15:

The first attribute in this group was, *liaison skills with being attractive and using all contact approaches and communication skill professionally*, with RII of 88.11%. Since one of the main coordination duties is effective communication, consequently liaison skills obtained a critical priority. The obtained results agreed with Mohsin *et al* (2009) who emphasized that, liaison skills appear as one of the most important coordination attributes, which provide the communication channels with the others parties.

The second attribute among education and gained skills group was, *the university degree, either a civil /architect engineering, planning or a related field*. While the university educational provides the coordinator with the primary scientific knowledge in construction projects management and implementation, this attribute obtained RII of 87.20 %. Also, Xue *et al* (2007) get the same findings in the coordinator certification filed as civil /architect engineering, which make the coordination process different, especially in the feasibility and implementation stage. The third attributes in this group was, *computer modern software's application professionalism*, with RII of 82.86 %. Where the computer software's become an effective tool in construction project and facilitate planning, scheduling, control and evaluation process.

Table 4-15: Education and gained skills attributes RII and rank

Education and gained skills attributes	RII	Rank
Has a civil /architect engineering, planning, certification or a related field.	87.20	2
Familiar with problem solving "negotiation, arbitration, courts" and managing the parties' relations "duties and right.	78.74	6
Has liaison skill, with being attractive and using all contact approach and communication skill professionally.	88.11	1
Cleverness planner with accurate result in case of forecasting.	79.77	5
Has resources management skills, efficiently and optimally.	81.37	4
Has computer modern software's application professionalism	82.86	3

4.4.1.2 Technical attributes group

Technical attributes represent practical experience in construction projects. Coordinator technical attributes measures with the previous work in the same project field. The RII of all technical attributes illustrated in Table 4.16:

The first attribute in this group was *technical knowledge about the main subject of the work*, with RII of 85.94 %. Whereas the technical knowledge is the coordinator support from feasibility to implementation stage. The obtained results agreed with Jha and Iyer (2006) as they emphasized that, any unenlightenment in technical issues will lead to conflicts and disputes in coordination process.

The second attribute was *the previous experience in coordinate similar project or in similar track*, with RII of 83.31%. This attribute dealing with the practical coordination of deeply realization of the project nature. Also, Mohsin *et al* (2009) found that, coordination experience represent the practical trust during disputes solving and discussions.

The third attribute was *the familiarity of the measuring methods and evaluation criteria's for the project*, with RII of 82.17 %. This critical attribute will reflect the quality duties in measuring evaluation and affect in measurement sheet review and approval. However, the obtained results did not agree with Jha and Iyer (2006), whereas this attribute does not appear among the most important coordination attributes and they found this attribute nearest to the quantities survey.

Table 4-16: Technical attributes RII and rank

Technical attributes	RII	Rank
His/her technical knowledge about the main subject of the work "pavements in roads, pumps in wells".	85.94	1
His/her experience in the type of project works or nearest track.	83.31	2
Familiar with measuring methods and evaluation criteria's in similar projects/contracts.	82.17	3
His knowledge of project finance, taxes laws and budget limitations.	78.06	5
Reliance on systematic approach, as a result of his/her deep technical knowledge "reasons/results".	81.83	4

4.4.1.3 Personal attributes group

Personal attributes are the gained or inherited features, based on his habits and believes. Those attributes appear in the daily treatment with personal. The RII of personal attributes illustrated in Table 4.17:

The first attribute in this group was the sharp charisma and independence in decision making, with RII of 90.4 %. This attribute affect the coordinator real picture and his weight on the decisions making, and how the subordinates take his instructions. The results agreed with Jha and Iyer (2006) as they emphasized that, the coordinator charisma determine his behavior and the other respect during the project.

The second attribute was the coordinator commitment to meet deadlines on works handing over, with RII of 87.66 %. This attribute represent the achievement concept in coordination characteristic. The third attribute in this group was the physiognomy in prediction and planning, with RII of 86.86 %. The prediction attribute with accurate depend on internal sense and talent, which produce right decisions in planning process. The results agreed with Mohsin *et al* (2009) who emphasized that, predication is talent, the coordination have to gain its sense especially during planning stage.

Table 4-17: Personal attributes RII and rank

Personal attributes	RII	Rank
Has sharp charisma and independence in his decision.	90.40	1
Always meets deadlines for works handing over.	87.66	2
Has a physiognomy in prediction and planning.	86.86	3
Respects the others opinions in spite of difference from his point of view.	83.66	5
Apologizes when he/she has mistaken.	79.54	7
Understands the others excuses in case of apologies.	75.43	9
Understands human psychology, so he/she can deal with different cultures.	83.20	6
Concerned for the conciliation from his/her direct supervisor and the top management.	71.31	10
Concerned for other's ego, so he/she makes them feel satisfied.	76.69	8
His/her age is in certain age group.	63.20	12
What others "project parties" say about him/her.	69.60	11
Has a diplomatic character, so he/she can persuade.	86.51	4

4.4.1.4 Integrity attributes group

The integrity considers as unmeasured attributes, but very critical in the coordination process success in construction projects. All integrity attributes illustrated in Table 4.18: The first attribute in this group was *internal integrity to the project, work interest and the relation between the parties*, with RII of 92.46 %. This attribute treated coordinator interest on the project and relation during and out the working time, and the coordinator devotion for the project success. Jha and Iyer (2006) found that, the coordinator internal integrity represent incentive to the work, and without integrity the coordination doesn't improve the parties' cooperation in the project.

The second attribute in this group was, *looking for improvement and development in the coordination technics for the project*, with RII of 81.83 %. In this attribute the creativity and invention out of the regular routines, where the new technics will save the time and effort in the project. The results agreed with Mohsin *et al* (2009) who emphasized that,

the improvement in the coordination technics reflect effectively on the project objectives achievement status.

The third attribute was *the satisfaction level from the all sides*, with RII of 62.29 %. In this critical attribute, the work incentive from the salary and fringes effect on the final status of the coordination process. Also, Merloa and Girard (2004) and Jha and Iyer (2006) found that. The coordinator satisfaction level provides an ideal working context and improves the relations between parties.

Table 4-18: Integrity attributes RII and rank

Integrity attributes	RII	Rank
His/her integrity to the project, work interest and relationship between parties.	92.46	1
If the coordinator biased for party/his employer.	54.97	5
If the coordinator looking for working for party other than his current employer.	53.14	6
The employer violates the coordinator rights	57.71	4
If the coordinator feels unsatisfied on his/her current work from "money or respect"	62.29	3
The coordinator not just done his/her work, but he looks for improving and developing the work environment.	81.83	2

4.4.2 Factor analysis of coordination attributes

In this study, factor analysis was applied to explore the underlying constructs of the coordination attributes in construction projects to classify them into suitable clusters. The classification was done in a series of steps. Factor rotation is the method to investigate the hypothesized structure of the loadings, demonstrate that the loadings are difference. Once the set of loadings is calculated which yields theoretical variances and covariance that fit the observed ones as closely as possible according to a certain criterion. It is customary to apply rotation in an effort to set of loadings that fit the observations equally well, but more easily interpreted. The goal is to make some of these loadings as large as possible, and the rest as small as possible (Shen and Liu, 2003).

4.4.2.1 Education and gained skills group factor rotation

The education and gained skills attributes were processed in the prewise procedure of factor analysis, using extraction method with principal component analysis, by Varimax with Kaiser Normalization rotation method. The loading results from rotated component matrix of the two clusters are illustrated in Table 4.19:

Table 4-19: Factor Rotation results between education and gained skills attributes

No	Education and gained skills attributes	Clus. 1	Clus. 2
1.	Has a civil /architect engineering, planning, certification or a related field.		0.934
2.	Familiar with problem solving "negotiation, arbitration, courts" and managing the parties' relations "duties and right.	0.486	0.578
3.	Has liaison skill, with being attractive and using all contact approach and communication skill professionally.	0.700	
4.	Cleverness planner with accurate result in case of forecasting.	0.834	
5.	Has resources management skills, efficiently and optimally.	0.767	
6.	Has computer modern software's application professionalism	0.498	0.330

After the loading factor distributed between the two clusters, each attributes cluster was investigated and interpreted as followed:

Cluster 1 included the issues of liaison skills, forecasting and planning skills and resources management skills. Those skills will provide the coordinator with good planning approach. These factors were closed to each other's as all attributes medium loaded. *Cluster 2* included the issues of academic certification and problem solving approaches. These factors were nearly closed to each other's as all duties were medium loaded.

4.4.2.2 Technical attributes group factor rotation

The technical attributes were processed in the prewise procedure of factor analysis. The loading results from rotated component matrix of the two clusters are illustrated in Table 4.20:

Table 4-20: Factor Rotation results between technical attributes

Technical attributes	Clus. 1	Clus. 2
His/her technical knowledge about the main subject of the work "pavements in roads, pumps in wells".	0.794	
His/her experience in the type of project works or nearest track.	0.782	
Familiar with measuring methods and evaluation criteria's in similar projects/contracts.	0.557	0.517
His knowledge of project finance, taxes laws and budget limitations.		0.790
Reliance on systematic approach, as a result of his/her deep technical knowledge "reasons/results".		0.795

After the loading factor distributed between the two clusters, each attributes cluster was investigated and interpreted as followed:

Cluster 1 included the issues of technical knowledge, experience and measuring and evaluation methods. The emerging of measuring and evaluation as a result of wide technical knowledge and experience. These factors were nearly closed to each other's as all attributes were medium loaded. *Cluster 2* included the issues of finance knowledge and systematic approach in technical issues. These factors were nearly closed to each other's as all duties were medium loaded.

4.4.2.3 Personal attributes group factor rotation

The personal attributes were processed in the prewise procedure of factor analysis. The loading results from rotated component matrix of the three clusters are illustrated in Table 4.21:

Table 4-21: Factor Rotation results between personal attributes

Personal attributes	Clus. 1	Clus. 2	Clus. 3
Has sharp charisma and independence in his decision.			0.831
Always meets deadlines for works handing over.			0.764
Has a physiognomy in prediction and planning.	0.335		0.619
Respects the others opinions in spite of the difference from his point of view.	0.697		

Personal attributes	Clus. 1	Clus. 2	Clus. 3
Apologizes when he/she has mistaken.	0.809		
Understands the others excuses in case of apologies.	0.726		
Understands human psychology, so he/she can deal with different cultures.	0.583		
Concerned for the conciliation from his/her direct supervisor and the top management.	0.316	0.622	
Concerned for other's ego, so he/she makes them feel satisfied.		0.652	
His/her age is in certain age group.		0.796	
What others "project parties" say about him/her.		0.780	
Has a diplomatic character, so he/she can persuade.	0.344		0.382

After the loading factor distributed between the three clusters, each attributes cluster was investigated and interpreted as followed:

Cluster 1 included the issues of difference cultures dealing, apologizing and human psychology. Where the dealing with difference cultures need wide human psychology and courage for apologizing. These factors were nearly closed to each other's as all attributes were medium loaded. *Clusters 2* included the issues of top management opinion of his/her work and respect the other's ego. These factors were nearly closed to each other's as all duties were medium loaded.

Clusters 3 include the issues related to charisma and physiognomy in prediction. Where the diplomatic character assigned as a result of sharp charisma and physiognomy in prediction. These factors are nearly closed to each other's as all attributes were medium loaded.

4.4.2.4 Integrity attributes group factor rotation

The integrity attributes were processed in the previse procedure of factor analysis. The loading results from rotated component matrix of the two clusters are illustrated in Table 4.22:

Table 4-22: Factor Rotation results between personal attributes

Integrity attributes	Clus. 1	Clus. 2
His/her integrity to the project, work interest and relationship between parties.		0.759
If the coordinator biased for party/his employer.	0.739	
If the coordinator looking for working for party other than his current employer.	0.782	
The employer violates the coordinator rights	0.856	
If the coordinator feels unsatisfied on his/her current work from "money or respect"	0.750	
The coordinator not just done his/her work, but he looks for improving and developing the work environment.		0.834

Cluster 1 included the issues of bias for any party, job improvement and unsatisfied feel. The emerging of those factors in the same cluster to identify the influence of the others treatment to the coordinator. These factors were very closed to each other's as all attributes were highly loaded.

Clusters 2 include the issues of work interest and work environment developing. As the high integrity of the coordination will provide the suitable environmental for creation and improvement. These factors were very closed to each other's as all duties were highly loaded.

CHAPTER 5

CASE STUDY

5.1 Introduction

Case study represents one of the data collocation approaches in construction management research. This in-depth investigation of particular instances within the research subject provides the researcher with detailed information about the project. The nature of the in depth data collection and the information securely may limited the number of cases (Morse *et al.*, 2002; Rothgeb, 2003).

This chapter presents the results of case study form completed construction project, which was awarded in the last three years in Gaza strip. Project description, summarizing of life cycle, implementation stage, operation process, problems encountered in various project stages (including feasibility works) are outlined and discussed in detail. All coordination duties and attributes were tracked and followed-up in all project stages. The assessment of all project parties' coordination process involved is presented. Finally, the lessons learned from the case are presented.

5.2 Village and Neighborhood Development Project (VNDP)

The case of Village and Neighborhood Development Project (VNDP) was studied to investigate the coordination duties and attributes in construction industry, and to compare it with the results of the questionnaire.

5.2.1 Project description

The VNDP is considered a developmental project. The aim of the project is to improve the living circumstances for the Palestinian citizens, whom living in villages and neighborhoods. This project has been executed in the PA territory, West Bank and Gaza Strip (WBG). The Palestine Liberation Organization, for the benefit of the Palestinian Authority (PA), has received a fund, in the amount of US\$10 million, from the World Bank (WB) toward the cost of implementing VNDP. This fund is to contribute in part to Palestinian Reform and Development Plan (PRDP), in its vision for a future Palestinian state. The planed duration of the project was four years, started on early 2008 and will finished at the end of 2012, it was divided into two successive cycles, two years for each.

In Gaza Strip, there are 13 neighborhoods and 3 blocks were targeted " block: in refugee camps are the equivalent of a neighborhood" in urban refugee camps. These are located in Rafah, Khan Younis and North District. Project activities in neighborhoods were coordinated with municipal authorities within whose jurisdiction. Activities in refugee camps were coordinated with the Department of Refugee Affairs (DoRA), the national entity responsible for assisting refugee populations (Project Appraisal Document, 2008).

5.2.2 Project objectives

The VNDP development objectives were:

- To build the needed facilities in the villages and neighborhoods.
- To improve the infrastructure conditions in the villages and neighborhoods.
- To promote a coordinated development approach, and builds the capacity of communities.

Within those objectives, for instance, VNDP contributed to the PRDP's goal of bringing the local government closer to the people by ensuring that local government was both strengthened and accountable, creating better economies of scale in service delivery and building social capital. It was designed to assist neighborhoods, village communities and refugees within WBG to use a Community Driven Development (CDD) model of implementation to manage and target resources within the context of a project, which was coordinated by their government. Moreover, the VNDP was to be a replicable model of participation and development designed to attract the support of additional donors working in the region (supported Rafah group 2009); Project Appraisal Document, 2008).

5.2.3 Project components

VNDP had been implemented through three components in each cycle. Those three components were designed for facilitated project implementation process. The WB had prepared a detailed Operations Manual (OM) that describes the creation of all projects elements (Project Appraisal Document, 2008). The details of each component are illustrated as follows:

5.2.3.1 Component 1: Implementation of subprojects using CDD approach

VNDP provided block grants to marginalized communities in Gaza Strip to finance projects identified through a participatory mechanism. The targeted populations are those have been marginalized due to restrictions on mobility, and remote areas which have received little donor assistance. The total population targeted is, 108,289 people living in isolated areas or poor neighborhoods and refugee camps in Gaza.

The subprojects varied according to community needs, but were for the public benefit. Examples might include small-scale infrastructure such as parks or recreational areas, access roads, markets, small scale water supply, school enhancement; social programs design and implementation of activities in a youth center; cultural activities that bring together different communities. The project adopted an open-menu approach but established criteria for selection based on a negative list such as political or religious activities, investments detrimental to the environment, rehabilitation structures of archeological or cultural value as described in the OM.

5.2.3.2 Component 2: Capacity building for communities and LGUs

This component provided necessary skills for human resources for accompanying communities throughout the four-year life of the project in implementing Component 1. VNDP provided capacity building and coaching services to communities during project implementation. This included facilitation and community mobilization to enhance community participation, preparation of Area Development Plans (ADPs), project proposals and implementation guidance on technical and financial aspects. Capacity building also enabled communities to leverage funds from other sources (including their own resources) and to improve coordination with line ministries and other actors within the area to implement ADPs. This was enabled communities and the Ministry of Local Government (MoLG) to learn lessons from best practice experiences and find ways for solving obstacles that may arise during project implementation, thus enabling MoLG to adjust VNDP processes in a timely manner.

5.2.3.3 Component 3: Institutional support for the counterpart institution

This component supported MoLG to supervise implementation of the project by communities, including promoting the participatory planning processes and maintaining a knowledge base for local development. It supported MoLG at both the central and local levels in taking the lead on setting standards and policy directions for community development. This component is not valid in Gaza Strip due to the current political consideration.

5.2.4 Project parties

World Bank (WB): Is the donor of this project, with a developmental vision for the population of villages and neighborhood in the Gaza Strip. Their vision implemented with PA partnership through MoLG and their Project Management Team (PMT). WB appoints an international consultant to study the feasibility of the project and all obstacles may face the project, and suggest the best proposed solutions. World Bank mission in supervision was to undertake semi-annual supervision missions to review progress of the project, including its monitoring and evaluation function, institutional assessment and the external audits served as critical inputs. The World Bank field team was supervising VNDP implementation closely with MoLG, PMT.

Ministry of Local Governments (MoLG): Is the PA representative in this project, has the authority on the municipality on all areas. MoLG assigned a Project Management Team (PMT). As VNDP implementing agency MoLG followed up the implementation of the project. MoLG intends to use part of the proceeds of the grant to contract for Oversight Consultant (OC) to support and facilitate the mobilization process of the project in Gaza Strip.

Municipalities: Is a local society to provide services for the population of its area. Municipality is the arm of the MoLG in the all governments in Gaza. As the subproject implemented in their authority area, it can provide a very helpful logistic services for the VNDP. Municipalities directly deal with contractors with the OC advices.

Oversight Consultant (OC): Its task is to accomplish the work in the Gaza Strip under the supervision of the MoLG in accordance with the details presented in the OM and the signed contract. This assignment was for 18 months and renewable. The summary of OC activities are as indicate; information dissemination, planning, proposal review and coordination in addition to the technical advice.

Contractors: Are the execution parties of the project in the site. They are one of the main beneficiaries of the project and have a large influence in the final results. The contractors work directly under the municipality supervision and the OC and MoLG as upper-supervision. Actually the contractors were paid by the MoLG.

VNDP has five parties during its implementation life cycle; each of them has its own objectives in addition to the project objectives. To guarantee the project success, efforts must be done in coordination process between them. Figure 5.1 illustrate the implantation sequence of the VNDP. The start of this sequence is from PSGs and the completion of ADPs in the neighborhoods and blocks. To award a list of subprojects based on the priorities for the OC. The OC coordinate with the municipality to decide on the suitable subproject considering the budget from the donor limitation, and the available land from the municipality.

In case of PSGs and project review board approval on the suitable subproject, the municipality prepares the tender documents with the OC supervision and the MoLG monitoring. MoLG is the responsible party in front the PA, to satisfy the WB requirements. The WB own monitoring team in Gaza Strip; ask the PSGs if they satisfy their needs and were involved in all project stages. The previous sequence illustrates the complication path of the project and the coordination volume was exerted in all project stages (Project Appraisal Document, 2008).

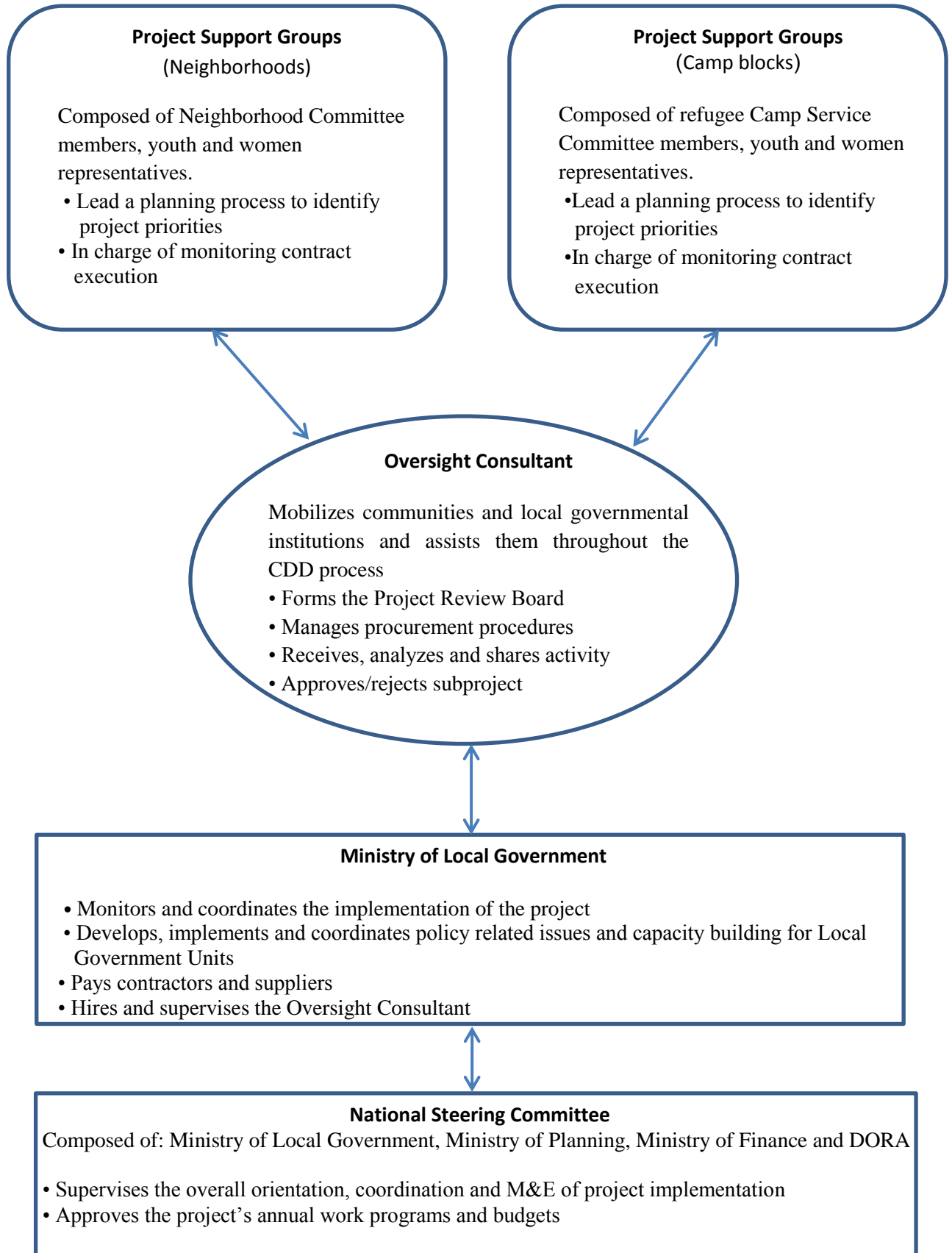


Figure 5-1: The implantation sequence of the VNDP stages

5.2.5 The coordination process of the VNDP

The *first stage* of coordination was at the community level, to form the PSGs for each of 16 areas between villages and neighborhoods in the Gaza Strip. Those PSGs members were selected based on assigned criteria in the operation manual. All project parties were involved in the selection process during the interviews; a complicated task was appear by agree or disagree of PSGs members. Consequently, the PSGs qualifications and skills were very important on the project success.

The *second stage* of coordination was in the capacity building and training process of the PSGs. The needed skills, the methodology and technics of training, the best trainer and all logistics facilities as place tools and others need to be carefully coordinate. The oversight consultant is the main coordinator in this stage.

The *third stage* of coordination was, between PSGs in order to finish the needs assessment of their area and finalized the ADPs with order based on priorities. The oversight consultant play a very critical role in this stage, in addition to the coordinator duties he must advice and persuade the PSGs with higher priorities subproject which compatible with the assigned budget and time duration. Any missed choice mean the project objectives weren't achieved and the beneficiaries weren't satisfied (Project supported Khanyones group, 2009).

The *fourth stage* of coordination was, the compatibility between all tender documents must be guaranteed by the oversight consultant. After the consensus between the all project parties on a suitable subproject. The municipality took care of tender documents preparing with all specifications, conditions and drawings for the consensuses project. Due to the Gaza Strip material availability conditions in the local market must be checked through coordination with local suppliers. The donor (WB) imposes constraint upon some materials for quality and political consideration as smuggled construction materials from Egypt. The oversight consultant solved this conflict and took the responsibility of the material quality, and persuaded the donor to approve the materials. The municipality in this stage assigned an adequate site of the subproject, as water well or parks and culture centers, taken the consultant advice in consideration (Project supported Khanyones group, 2009).

All parties must be involved in the evaluation and awarding process, in this stage the donor WB has a black list of contractor to be excluded. Any subproject was over estimated must be re-tender or minimize the scope of it if possible. Through this stage a close coordination duties is needed among all contract parties.

After the contract was signed, the municipality was directly supervising the subprojects implementation. The OC and MOLG followed up with upper supervision. All details' of implementation as; shop drawings, materials approval, quality assurance and over all subproject progress was coordinated between all parties.

The financial issue of the project was complicated as WB constraints especially in Gaza Strip. Strong constraints were found on the paying out and approval. Figure 5.2 illustrates the flow of cash in the VNDP. It was very slow, which was very disturbing issue for the contractor and effect on the project progress. Very serious coordination was done to spending the money by all parties (Project Appraisal Document, 2008).

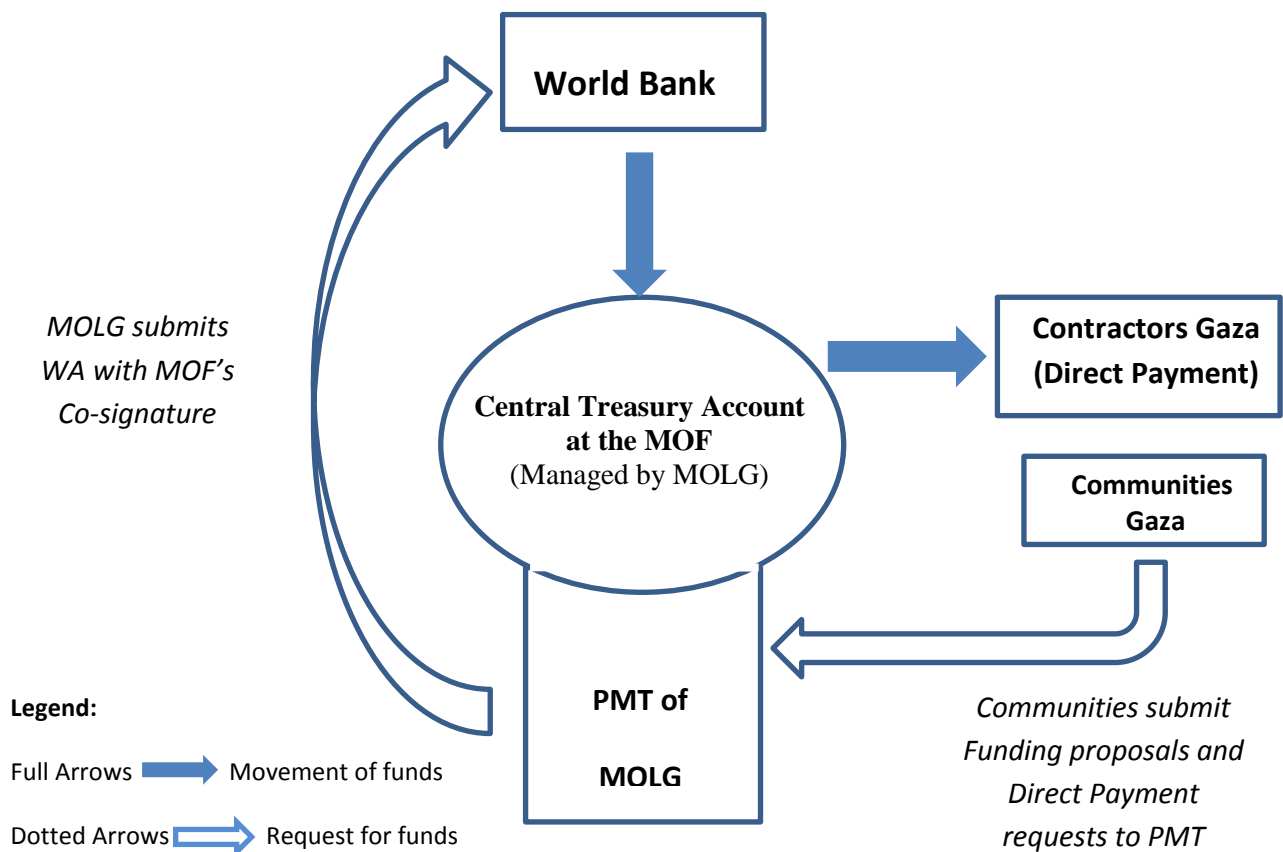


Figure 5-2: The flow of cash and approval process

5.2.6 Reporting process in VNDP

Reports are the external view of the project; all needed information were written and illustrated with evidence in reports. The reporting process illustrates the volume of coordination and cooperation in this project between all parties. As shown in Figure 5.3, the reporting from the lower level in the contractor to municipality which was direct supervisor (Project Appraisal Document, 2008).



Figure 5-3: The reporting process of the VNDP

The municipality was reporting to the PSGs committee. The oversight consultant was coordinating this process and took a copy of this report, and then he reported to the PMT in Gaza Strip which reported to the MoLG. The MoLG is the PA representative in the WB, so that they reported to the WB, the final donor of the project.

5.2.7 Questionnaire results comparison with VANDP case

The questionnaire results, as illustrated in chapter four, was studied and compared systematically. This investigation was to measure the applicability of the questionnaire results on an actual case. The coordination duties were studied firstly, then the coordination attributes in the followed paragraphs.

5.2.7.1 Coordination duties investigation

Coordination duties and responsibilities were investigated and reviewed in the VANDP between all parties. All information was gained from the working teams in the project and the available documents of the project. The results were illustrated below with the same order of duties groups important in the previous chapter.

A. *Contract implementation duties group*

Agreements were signed between the WB and the PA, representative with MoLG, to donate the project. The MoLG, after a competition offers from the consultation companies, signed a contract with optimum technical and financial offer. The OC made a joint venture with capacity building experts to implement the first stage of the project which was training the PSGs members. Contracts were signed with municipalities, in all project areas (16 agreements distributed in Gaza Strip municipalities). Finally, and after the subprojects approval and bidding process completion, contracts were signed with the winner contractors.

The *first duty* in this group was, check/ follow up the implementation of all contractual commitments; this duty was applied during the VANDP implementation. The WB checked and followed up all agreements clauses as; the black list project, the assigned

budget for each area based on their population and all other clauses. The MoLG coordination team checked and followed up all agreements with municipalities. Other parties like OC checked their agreements and contract with project contractors.

The *second duty* was, provide an organized information collocation and archives, all coordination teams in the project were arranged the needed information systematically. In each stage a copy of the needed information attached to supervision parties "OC, MOLG and WB". In case of disputes or claims between any parties, the needed information was available in well-arranged manner.

The *third duty* was, keeping joint records of all input cost for non-tendered items to control the variations, this duty was applied mainly by the coordination team of the municipality and the MoLG after any variation approval. All input cost for non-tendered items were archived in the municipality, MoLG and OC.

The *fourth duty* was, solving the conflict in tender documents in contractual frame, this duty was applied mainly by the OC. After tender documents preparing, OC reviewed them coordinated with the municipality and MoLG before and during the implementation stage.

B. Quality and performance duties group

In the VNDP the beneficiary was involved from the begging of the project, the quality was considering within their needs as one of the project limitations. Due to the closer on Gaza Strip, a problem of material quality and availability was appeared. All donors created constraints on quality issues in that time.

The *first duty* was, arranging carry out of all tests for inspections by the supervision/consultant and maintaining records of the results. All coordination team in VNDP was involved in this duty, the municipality, OC and MoLG. Some examples were; the compaction tests in road layers, the concrete compression test, blocks test and the test of water wells pumps.

The *second duty* was, monitoring the quality level, and the power to stop the defect works. This duty mainly was applied by the OC and MoLG coordinators during their

regular sites visits of the subprojects. This duty made their visits effective and quality assurance level was achieved, after they stopped the defect works in the subprojects.

The *third duty* was, arranging submission of materials samples for approval by the supervision/consultant, considering other parties reservedly. This duty has its especial important as the OC took the responsibility of the materials quality in front the WB. The OC coordinator with the municipality was dealing with samples submission and approval.

The *fourth duty* was, following up with offsite fabricators for any reason, if it's within the acceptable quality range. Due to Gaza Strip circumstances some violations was made which need especial monitoring of its reason and effect. MoLG and OC coordination team followed up all violations and its effect on the subprojects function.

C. Planning and scheduling duties group

In the VNDP, planning and scheduling duties was critical as the duration was four years. The large duration of the project need a care in planning and scheduling. In this case, a large coordination effort was done to complete the VNDP planning and scheduling. The plan was divided into two cycles, each one was two year. The cycle plan was divided into three components; each component has its own plan and scheduling.

The *first duty* in this group was, contribution in plan preparing for project procurement, implementation and tracking. WB finished a complete primary plan, to be as guide line in the project implementation before the project start. The coordination team in the MOLG, before and after the project approval, coordinates with the WB for the project plan. A small plan of each sub-project was made with coordination between the municipality and OC and the MoLG to be integrated with master plan of the VNDP.

The *second duty* was, preparing progress reports, and tracking all project phases as required. The MoLG coordination team mainly made this duty from the start of the capacity building and during the subprojects selection and implementation. The OC also prepare a progress reports and tracking the project implementation.

The *third duty* was, contributing in determination the project phase's duration, and the overall duration. In the VNDP the overall duration was determine by the WB early without any coordination. But in phase's duration, coordination and intervention from the MoLG and OC was appearing. As they near the implementation area and know the site details.

The *fourth duty* was, informing of construction parties in the project with all needed information to guarantee the time limitations achievement. This duty was done by the OC coordination team, if any conflicts in time limits appeared in the subprojects implementation, and informed the municipality and MoLG.

D. Health and safety duties group

In the VNDP before any implementation plan approval, safety consideration was interested. Health and safety issues were applied based on the OC instructions and WB regulation. All parties were involved in the safe implementation mission of the project.

The *first duty* in this group was the early consideration of the safety regulations as consider safety from design stage, to guarantee safe implementation. The OC and the MOLG coordination team during the subprojects approval stage, considering the safety and health issues. Any dangerous design of the subproject was rejected early.

The *second duty* was, informing all related parties "donor, owner, insurance company..." in case of accidents. The coordination team of the MOLG and OC were monitoring and recording any accidents was happen and informs all related parties. Fortunately no death or large accident was recorded during the project implementation.

The *third duty* was, safety program preparing for the dangerous works implementation. In early stage on coordination, a safety program was made of the VNDP project by the WB. The subprojects safety program was made by the contractors if needed and approved by the municipality and OC.

The *fourth duty* was, checking availability of personal protective equipment as needed for the site team. During the regular OC and MoLG coordinators visits to the site this check was made.

E. Budget and cash flow duties

The budgeting issues were determined by the WB team. The budget for each area distributed based on their population. As shown previously in Figure 5.2, which illustrated the complication of the cash flow in the VNDP. All those complication was solved by more coordination, during the measurement sheets preparing and the paying out time.

The *first duty* in this group was, cost monitoring of all activities and taking corrective action if needed to guarantee the cost constraints of the project. As the budget of each subproject was determined, the monitoring of activities cost was very important for all parties to prevent the over budget states. This monitoring was done by the OC and MOLG coordination team and they canceled some items if they predicted over budget.

The *second duty* was, to make the project objectives consist with the assigned budget. This duty was applied in subprojects selected stage, by the OC and MoLG coordination team. As they made a cost estimate for each subproject to compared with assigned budget.

The *third duty* was, the variation order direct cost determination, and its effect on the overall budget. This duty was applied during the subprojects implementation, in case of any variation. The OC and the MoLG coordination team studied every variation cost and its effect on the budget before approval.

The *fourth duty* was, make the payments consistent with the work progress state, donor financial state and contractor liquidity. This duty was done by the coordination team involved in the project from the municipality up to WB to control the project cash flow.

F. Resources and team management duties

The resources and team management was not considering seriously with the coordination team in the VNDP. The contractor was involved mainly in those duties. But some of those duties dealing with coordination team, as stop new subproject in case of no resources available to follow up the new project.

The *first duty* in this group was the motivation for project participants to achieve the planned productivity rate. During the coordination team visits they motivate the working team in the project sites, but not in their main duties.

The *second duty* was, develop a team spirit and accept suggesting input from all participants' culture. This duty was not seriously involved in the coordination team in the VNDP.

The *third duty* was, acting as liaison between all constructions parties to facilitate the communication. The coordination team of the OC and the MoLG applied this duty from the PSGs training to the handing over stage, especially with the WB to inform them with project progress.

The *fourth duty* was, resolving differences/conflicts/confusion among participants. This duty was applied seriously by OC coordination team as they independent party in the project. Disputes appear normally in the construction industry, some of them appear in the VNDP implementation stage, and solved by coordination team of OC and MoLG.

5.2.7.2 Coordination attributes investigation

Coordination attributes and characteristics were investigated and reviewed in the VNDP between all parties. All information was gained from the working teams in the project and the available documents of the project. The results were illustrated below with the same order of attributes groups important in the previous chapter.

A. Education and gained skills attributes

The strong certification and gained skills is the base of the coordination knowledge of construction projects implementation sequence for the VNDP from needs assessment to handing over. This group represents the academic certification and gained skills by training and practical courses.

The *first attribute* in this group was liaison skills with being attractive and using all contact approaches and communication skills professionally. The most of the VNDP coordination team were good in liaison skills between them and the external context of

the project as the PSGs. The communication skills in the VNDP facilitate the information flow between construction parties.

The *second attribute* was, the university certification filed, if in a civil/architect engineering, planning or a related field. In the VNDP project all coordination team members were civil and some architect engineer, the OC and the municipalities have the other specialization of engineering as electrical and mechanical.

The *third attribute* was modern computer software's application professionalism like drawing, planning and calculations. All coordination team members have this professionalism. The drawings and calculations sheet were produced professionally.

B. Technical attributes group

Technical attributes are the previous work in the same project field and the practical knowledge of the work. The coordination team in the VNDP has more than seven years' experience.

The *first attribute* in this group was technical knowledge about the main subject of the work. The coordination team was allocated based on their experience in the subproject subjects. The subprojects varied between buildings, water wells and road rehabilitation.

The *second attributes* was, the previous experience in coordinate similar project or in nearest track, in the VNDP not all coordination team coordinate same project, but similar projects.

The *third attributes* was, the familiarity of the measuring methods and evaluation criteria's for the project. This attribute was appear in the VNDP as all coordination team measured and evaluate subprojects as needed without any disputes.

C. Personal attributes group

Personal attributes represent the behaviors, conducts and actions occur according to the general thinking and believe. In the VNDP coordination team members have good personal attributes.

The *first attribute* in this group was the sharp charisma and independence in decision making. All coordination team in the VNDP have adequate charisma for implementing this project. Decision making process in the VNDP has determined in the WBS, every party knew his area of decision and variations.

The *second attribute* was, the coordinator commitment to meet deadlines on works handing over. In the VNDP the coordination team the most of deadlines were achieved from construction parties. Some deadlines were not achieved due to external conditions and out context of the subprojects.

The *third attribute* was, the physiognomy in prediction and planning. The coordination team planning was adequate in the visible conations in the subprojects.

D. Integrity attributes group

Integrity attributes represent internal feeling consist from the general context of the project and reflects the level of satisfaction as a result of the project environment. In the VNDP coordination team has the integrity to their subproject, as they decide the type, objectives and implementation technics.

The *first attribute* in this group was internal integrity to the project, work interest and the relation between the parties. All coordination team in the VNDP have adequate relation for implementing this project. Work interest was the aim of all coordination team.

The *second attribute* was, the looking for improvement and development in the coordination technics for the project. In the VNDP the coordination team always tried to improved coordination technics between them, with new technics which save the time and effort in the project.

The *third attribute* was, the satisfaction level from the all sides. The coordination team members were satisfied, expect some temporary situations. As the coordination team have all requirements for coordination process.

CHAPTER 6

**CONCLUSIONS
AND
RECOMMENDATIONS**

6.1 Introduction

The purpose of this chapter is to present a brief summary of the research and its conclusions. As well includes practical recommendations to improve the coordination mechanism and determined the most important duties and attributes of coordination in the construction projects in the Gaza Strip. The assigned objectives were achieved through two research methods. The first method included questionnaire survey, after intensive literature review to collect all required information. This method was necessary to identify coordination duties and attributes and to rank them based on relative importance in construction projects. The literature review, pilot interviews and researcher experience were led to identify 79 coordination duties which were classified into six groups and 29 coordination attributes which classified into four groups. Factor analysis was applied to categorized coordination duties and attributes deeply. The second method included case study approach, which provides a deep investigation and specific information of the coordination process in Gaza Strip projects. Case study was compared with questionnaire results, in order to obtain practical evidence of the results.

6.2 Conclusions

This part concludes the main findings of the research in duties and attributes of coordination exploration. The results of the literature review indicate that the coordination process in construction industry in many countries attains more attention than in the Gaza Strip from all parties. This attention of coordination process guarantees smoothly project implementation with minimum disputes and obtained the quality level needed. The coordination process in Gaza Strip obtained good progress in its application, but it still needs more attention. Coordination process in construction industry is a sequential series, so that any failure on any stage will cause a coordination system collapse. The external donors have a large contribution in coordination application issues in Gaza Strip projects. Usually external donors and implementing agencies appointed a coordinator for each project. Recently, some owners and consultants appointed a coordinator for their projects. The contractors are in more need for coordination between the construction parties, in spite of this; they rarely assigned a special engineer for coordination duties.

6.2.1 Coordination duties

Coordination duties and its groups were ranked using relative importance index (RII). As shown in Table 6.1 coordination groups order was: **Contract implementation group** (79.34%), **quality and performance group** (78.95%), **planning and scheduling group** (78.90%), **health and safety group** (78.14%), **budget and cash flow group** (77.85%) and **resources and team management group** (76.11%). The rank of the most important twenty two coordination duties (all duties with RII more than 80%) distributed on the ranked groups, are illustrated in Table 6.1. This rank was according to the point of view of; donors, owners, implementation agencies, consultants and contractors.

The *first duty* among all coordination duties was, contributing in plan preparing for project procurement, implementation and tracking, with RII of 87.89 %. This duty was very important since the early including of construction parties views in the planning stage through coordination.

The *second duty* was, check/follow up the implementation of all contractual commitments, with RII of 87.09 %. Whereas the contract is the base of the agreement between construction parties, the follow up of its implementation is very critical in contract completion and the future cooperation.

The *third duty* was, provide an organized information archives as wariness from future claims, with RII of 84.01 %. This duty importance comes from claims wariness between construction parties during and after the project completion.

The *fourth duty* was, preparing progress reports, and tracking all project phases as required, with RII of 84 %. Since the reports represent the actual progress of the project to the top and out site management.

In order to investigate coordination duties deeply, factor analysis was applied. An exploratory factor analysis was assigned with the most common method of orthogonal rotation was consider for three factors clusters. All coordination duties in each group were distributed on the three clusters assigned, based on their loading factor.

The *first group*, contractual duties, clusters where: Cluster 1, contract implementation, relation natural, subtractions and variations approval. Cluster 2, illustrating the relation and disputes with subs. Cluster 3, providing an organized contractual information gathering and archives in the main tender or variation.

The *second group*, quality duties, clusters were: Cluster 1, quality measures, fabrications and materials availability. Cluster 2, quality assurance, alternatives with higher quality. Cluster 3, organizing the tests and samples approval.

The *third group*, planning and scheduling duties, clusters were: Cluster 1, scheduling, progress and critical path monitoring. Cluster 2, arrange project inputs, meetings and responsibilities. Cluster 3, plans preparing, durations determine and reporting.

The *fourth group*, health and safety duties, clusters were: Cluster 1, monitoring and checks the safety regulations and its tools. Cluster 2, safe design, safety program and equipment's. Cluster 3, informing the related party in case of accident and future lesions.

The *fifth group*, budget and cash flow duties, clusters were: Cluster 1, cash flows, records the quantity of disputes work and variation cost influence on budget. Cluster 2, alternatives available to apply value engineering concept. Cluster 3, budget determined, distribution and monitoring to cost control and inform all parties.

The *sixth group*, resources and team management duties, clusters were: Cluster 1, technical training, cooperation culture, motivation and organization breakdown structure. Cluster 2, anticipation procedures to allocating and discipline and delegation. Cluster 3, arranging resources distribution and minimize the waste as possible.

Table 6-1: Most important coordination duties

Duties Groups	Coordination Duties	Percent	Rank
Contract Implementation Duties	Check/ follow up the implementation of all contractual commitments.	87.09	1
	Provide an organized information archives as wariness from future claims.	84.10	2
	Keeping joint records of all input cost (viz. labor, material, plant, etc.) for non-tendered items to control the variations.	83.89	3
	Identify defects, deficiencies, ambiguities and conflicts in tender documents "drawings/specifications..." and having them resolved, within contract frame.	82.63	4
Quality and Performance Duties	Arrange carrying out of all tests for inspections by the supervision/ consultant and maintaining records of the results.	83.20	1
	Monitor quality level, and has a power to stop the defect works.	81.94	2
	Arrange submission of materials samples for approval by the supervision/ consultant, considering other parties reservedly.	81.26	3
	Follow up with offsite fabricators for any reason, if it's within the acceptable quality range.	80.46	4

Planning and Scheduling Duties	Contribute in plan preparing for project procurement, implementation and tracking.	87.89	1
	Prepare progress reports, and tracking all project phases as required.	84.00	2
	Contribute in determination the project phase's duration, and the overall duration.	82.51	3
	Identify information "which must be known", to inform all construction parties with it "as dead lines'.	81.60	4
	Contribute in determination of the variation orders duration, to consider its effect on the others.	80.11	5
Health and Safety Duties	Consider safety regulations from design stage, to guarantee safe implementation.	83.09	1
	Inform all related parties "donor, owner, insurance company..." in case of accidents.	82.29	2
	Contribute in preparing safety program for the dangerous work implementation, especially risky works.	80.11	3
Budget & Cash flow Duties	Contribute in determination of the variation orders direct cost, and its effect on the overall budget.	80.91	1
	Monitoring cost of all activities and taking corrective action.	81.2	2
	Contribute in determining the project objectives within budget limitation.	81.14	3
Resources and Team Manage. Duties	Motivate project participants to achieve the planned productivity rate.	81.49	1
	Develop a team spirit and accept suggesting input from all participants.	80.95	2
	Act as liaison between all constructions parties to facilitate communication.	80.91	3

After case study investigation and results comparison, the most important twenty two coordination duties, significantly have their effect on the project progress status in the case was discussed. As shown in the VNDP case, the check/ follow up the implementation of all contractual commitments duty, was very important especially for the WB and OC.

Arrange carrying out of all tests for inspections by the supervision/consultant and maintaining records of the results, this duty has its large effect on the quality assurance of the project. This duty was applied by the OC coordination team especially in Gaza Strip construction materials conditions. Form the planning group, contribute in plan preparing for project procurement, implementation and tracking. All coordination teams have applied this duty, whereas the plan represent the first view of the project for all parties included. In safety issue, consider safety regulations from design stage, to guarantee safe implementation, which was implemented by the OC coordination team during the design process and monitoring by the WB coordination team. Since variation

orders are disturb issue in construction, so that contribution in determination of the variation orders direct cost, and its effect on the overall budget duty, was critical duty for the MOLG coordination team due to early budget determination for each area. From recourses and team management, motivate project participants to achieve the planned productivity rate duty, was not very critical in coordination process for all party except the contractor.

6.2.2 Coordination attributes

In order to do all their duties, coordinators must be characterized by specific attributes. Those attributes were arranged in four classified groups. According the questionnaire results, the rank of the groups was: *education and gained skills attributes group* (83.01 %), *technical attributes group* (82.26 %), *personal attributes group*, (79.50 %) and *integrity attributes group* (67.07 %). In each group, the twelve attributes obtained more than 80% were illustrated in Table 6.2:

The *first attribute* among all coordination attributes was his/her integrity to the project, work interest and relationship between parties, with RII of 92.46 %. The importance of this duty as the integrity is the internal motivation of the coordinator work.

The *second attribute* was, has sharp charisma and independence in his decision, with RII of 90.40 %. Since this coordinator attribute represent the others respect to him and his instructions, it effect on achieving the coordination value in the project completion.

The *third attribute* was, liaison skill, with being attractive and using all contact approaches and communication skills professionally, with RII of 88.11 %. Whereas liaison skills are the way to good relations build between construction parties.

The *fourth attribute* was, always meets deadlines for works handing over, with RII of 86.66 %. Since this attribute give the trust to coordinator and the others be sure he will done the task professionally and on time.

Table 6-2: Most important coordination attributes

Duties Groups	Coordination Duties	Percent	Rank
Education and gained skills attributes	Has liaison skill, with being attractive and using all contact approach and communication skill professionally.	88.11	1
	Has a civil /architect engineering, planning, certification or a related field.	87.20	2
	Has computer modern software's application professionalism	82.86	3
	Has a resources management skill, efficiently and optimally.	81.37	4
Technical attributes	His/her technical knowledge about the main subject of the work "pavements in roads, pumps in wells".	85.94	1
	His/her experience in the type of project works or nearest track.	83.31	2
	Familiar with measuring methods and evaluation criteria's in similar projects/contracts.	82.17	3
	Reliance on systematic approach, as a result of his/her deep technical knowledge "reasons/results".	81.83	4
Personal attributes	Has sharp charisma and independence in his decision.	90.40	1
	Always meets deadlines for works handing over.	87.66	2
	Has a physiognomy in prediction and planning.	86.86	3
	Has a diplomatic character, so he/she can persuade.	86.51	4
	Respects the others opinions in spite of difference from his point of view.	83.66	5
	Understands human psychology, so he/she can deal with different cultures.	83.20	6
integrity attributes	His/her integrity to the project, work interest and relationship between parties.	92.46	1
	The coordinator not just done his/her work, but he looks for improving and developing the work environment.	81.83	2

For investigation coordination attributes deeply, factor analysis was applied. An exploratory factor analysis was assigned with the most common method of orthogonal rotation. All coordination attributes in each group were distributed, based on their loading factor.

The *first group*, education and gained skills attributes, clusters were: Cluster 1, liaison skills, forecasting and planning skills and resources management skills. Cluster 2, include academic certification and problem solving approaches.

The *second group*, technical attributes, clusters were: Cluster 1, technical knowledge, experience and measuring and evaluation methods. Cluster 2, finance knowledge and systematic approach in technical issues.

The *third group*, personal attributes, clusters were: Cluster 1, difference culture dealing, apologizing and human psychology. Cluster 2, top management opinion of his/her work and respect the other's ego. Cluster 3, include charisma and physiognomy in prediction.

The *fourth group*, integrity attributes, clusters were: Cluster 1, bias for any party, job improvement and unsatisfied feel. Cluster 2, work interest and work environment developing.

After case study investigation and results comparison, the most important twelve coordination attributes, significantly have their effect on the project progress status in the case was discussed. As shown in the VNDP case, all coordination team has a civil /architect engineering certification. Some of the OC and WB crews have master degree and very closed to coordination knowledge. The liaison skills and communication skills were observed significantly in the MOLG and OC crews, the work as connection bridge between the WB, PSGs and municipalities.

The VNDP has different types of subprojects, so that a various technical experience needed. Coordination team members of MOLG, municipalities and PSGs were distributed on the subprojects according to their technical knowledge. In case of technical issues disputes the OC crew were ready for advice.

The coordination team members were characterized with strong and diplomatic charisma and independence in their decision and the respect was the general feeling. However some conflicts have appeared as some personals in coordination team have shortage in their charisma and very ambiguous decision.

During the VNDP implementation, all coordination team have the integrity, which led to project success and continues. Always they were suggesting an improvement idea in the project implementation.

6.2.3 Job description and characterization for project coordinator

The job description is a critical document for every position. A good job description performs a number of important functions. It describes the skills and competencies that are needed to perform the duties for the coordination position. It defines where the job fits within the overall company hierarchy. The job description is used as the basis for the employment contract. The overview of coordinator job description tells the organization generally what a coordinator in that position does at the work.

This job is a challenging one, given the dynamic work schedule and changing work environment. The coordinator needs to juggle between and manage both the official work and the construction site work. The coordinator must coordinate the construction efforts through in-house and contract for new construction and rebuilding projects. The coordinator will act as a medium between construction parties, workers and senior project managers. The coordinator carries out the inspection of construction site and material, keeps a tab on the documentation, generates and updates the project files and reports. Sometimes, the coordinator needs to supervise and control all the financial aspects, contracts and agreements relating to the multiple construction activities. Based on the questioner results and the case study review, the job description can draw as:

The primary function of an engineer in this class is to perform professional engineering work involving construction project coordination, plan and specification review and cost estimating, engineering records. Three years of experience as minimum. Extra weight is given to behavioral competencies such as leadership, teamwork, flexibility, communication and initiative. The coordinator duties included, but not limited to the following:

- Coordinate with engineers and developers in designing the plant; draw and sketch installation and location of equipment; complete material orders needed for planned construction.
- Monitor contractor performance; insure adherence to terms and conditions of agreements.
- Perform site inspections for quality control.
- Coordinate permitting and make ready process.

- Communicate with Project Manager or designated supervisor regarding concerns about construction progress.
- May analyze departmental project information to determine and/or forecast trends utilizing detailed instruction received by department personnel.
- Generates and completes project reports.
- Creates and maintains project files
- May processed pay applications, joint check payments, and lien releases.
- Be familiar with specifications, shop drawings, and submittals.
- Maintain projects lists and close out documentation. Interface with general contractors and subs and be detail oriented with follow up skills.
- Responds to inquiries from department personnel regarding assigned project status.
- Assists department personnel in organizing work relating to specific assigned project deadlines and time constraints.
- Performs other duties as requested by project manager.

6.3 Recommendations

During this study, coordination process in the Gaza Strip construction projects was investigated seriously. Coordination process in the Gaza Strip construction context needs more attention, to escort the complications in the modern construction projects. In the Gaza Strip construction context as multi-parties, deep and continues coordination for all construction parties needed. From the results of questionnaire and case study in coordination duties and attributes in construction projects, the recommendations can be deduced for each party. The clear determination of coordination duties, and improving the needed attributes and skills are recommended for all parties. These recommendations suggest the role of each party including donors, owners, consultants and contractors, how to strength and improve the coordination strategies in the constructions industry in the Gaza Strip.

6.3.1 Donors' recommendations

The donors are recommended to improve their coordination technics by:

- Assigning a coordinator for each project or program.
- Widening coordinator authority in funds distribution.
- Increasing the coordinator contribution in planning stage.
- Providing the coordinator with suitable communications and transportation.
- Qualifying the coordinator in the contractual issues and regulations.
- Providing the coordinator with budgeting and cost control skills.
- Improving the coordinator personal skills like, sharp charisma and independence decisions.
- Improving the integrity feeling to the project, work interest and relationship between parties.
- Increasing the coordinator technical knowledge about the main subject of the work.
- Assigning a coordinator who works previously with same project parties, to be familiar with their working approaches.

6.3.2 Owners' recommendations

The owners are recommended to setup their coordination technics by:

- Widening coordinator authority in priorities selection and needs assessment.
- Increasing the coordinator contribution in specifications selects to adequate the needs, local market conditions and the compatibility between items.
- Assigning a coordinator for each project or program.
- Providing the coordinator with suitable communications and transportations.
- Qualifying the coordinator in the quality issues.
- Arranging a complete archive for their projects to be ready in case of claims and for future use.
- Directing the coordinator to satisfy the beneficiaries' needs and expectations, within the donors' visions and keeping good relations with them.

6.3.3 Consultants' recommendations

The consultants are recommended to improve their coordination technics by:

- Increasing the coordinator contribution in design stage and cost estimation.
- Assigning a coordinator, with wide experience in the main topic, for each project or program, preferring who has previously worked with those parties.
- Providing the coordinator with suitable communications and transportations.
- Qualifying the coordinator in tests, requirements issues and problem solving.
- Qualifying the coordinator in arranging submission of materials samples and approval.
- Providing the coordinator with reporting and tracking project phases as required.
- Qualifying the coordinator to impart to all parties with full trust in his technical and financial abilities issues in the project.
- Providing the coordinator with meeting arrangement skills for all construction parties and during the project development.
- Improving the coordinator personal skills like, attractive speaking and power to convince.
- Providing the coordinator with risk analysis concepts application and safety program preparing.

6.3.4 Contractors' recommendations

The contractors are recommended to setup their coordination technics by:

- Assigning a coordinator for each project, preferring who has previously worked with those parties.
- Widening coordinator authority in resources management and distribution between projects.
- Increasing the coordinator contribution in contractual issues and planning for implementation process.
- Providing the coordinator with suitable communications and transportations.
- Qualifying the coordinator in the construction sequence and implementation requirements.
- Qualifying the coordinator to impart to all parties with full trust and ensure that there are not conflicts of interest between them.

- Providing the coordinator with reporting and tracking all project phases as required.
- Qualifying the coordinator in health and safety regulations and safety program application.

6.4 Proposed Further studies

Coordination process in the Gaza Strip construction projects is a very fecundity context for research. In this subject there are multi-relations that needed more investigation and determination. After this research completion and the gap observed in the coordination subject among the literature review, the following suggestions were proposed:

- It is necessary to conduct a similar study to investigate the coordination duties and attributes in the West Bank construction projects.
- It is recommended to conduct a future study to identify the coordination process relationship between each construction party on separate manner.
- It is necessary to conduct a study to investigate relation between coordination process and the level of communications between parties.
- It is recommended to conduct a future study to identify the using of GIS techniques in improving coordination strategies in construction projects.



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ANNEXES

ANNEX 1: English Questionnaire

The Islamic University –
Gaza

Higher Education Deanship

Faculty of Engineering
Construction Management



الجامعة الإسلامية – غزة

عمادة الدراسات العليا

كلية الهندسة – إدارة التشييد

Questionnaire for

Duties and Attributes of Projects Coordination in Gaza Strip

Dear Sir / Madam

Coordination is the life line of construction management and one of the most critical processes on the path of the projects success, as its affect all management functions. Therefore, coordination also called the essence of management.

Please fill in the required information in the attached questionnaire that aims to identify the Duties and Attributes of Projects Coordination in Gaza Strip regarding the following:

Part I: Primary questions related to the respondent.

Part II: Questions related to the duties of coordination in Gaza projects:

1. Planning and scheduling duties
2. Resources management and team building duties
3. Contract implementation duties
4. Quality and performance duties
5. Budget and cash flow duties
6. Health and safety duties

Part III: Questions related to the attributes of coordination in Gaza projects:

1. Personal attributes
2. Technical attributes
3. Education and gained skills
4. Power and integrity attributes

This Research is part of the Master Study in the field of Construction Management at the Islamic University, by the researcher **Eng. Wesam S. Alool** under the supervision on **Prof. / Adnan Enshassi**.

I appreciate your effort in answering the questions in the questionnaire, knowing that the given information will be used only for the purpose of the scientific and academic study and will be treated confidentially.

Thank you for your cooperation...

Researcher

Eng. Wesam S. Alool
Dec, 2011

Part I: Primary questions related to the respondent:

(General Note: select one choice only unless otherwise stated)

1. Position :

- Projects manager Project coordinator
 Site engineer Office engineer

2. Years of experience:

- From 1 to 3 years From 4 to 5 years
 From 6 to 10 years From 11 to 15
 More than 15 years

3. Degree or education:

- Master B.Sc. Others

4. Organization type:

- Governmental International Non-governmental (NGO)
 Municipality University Private Sector

5. Organization attribute:

- Donor Owner Contractor Others

6. Number of employees in the organization:

- Less than 5 employee 6-10 employee
 11-15 employee more than 15 employee

7. Number of executed projects in the last 5 years:

- Less 5 Projects 5-10 Projects
 10-20 Projects More than 20 Project

8. Work volume in the last 5 years (USD):

- Less than 1 million \$ 1 –3 million \$
 3- 5 million \$ More than \$5 million

Part II: Questions related to the duties of coordination in Gaza projects:

(Please check the appropriate choice in the following paragraphs)

1- Duties related to planning and scheduling:

No.	Planning and Scheduling Duties	Important Degree				
		Very Important	Important	Moderate	Not Important	Least Important
1.	Contribute in plan preparing for project procurement, implementation and tracking.					
2.	Contribute in determination the project phase's duration, and the overall duration.					
3.	Prepare progress reports, and tracking all project phases as required.					
4.	Regular follow-up of work distribution to project participant" design, tendering, supervision..., if done as plan.					
5.	Identify information "which must be known", to inform all construction parties with it "as dead lines'.					
6.	Identification of activities on critical path, regard its sensibility.					
7.	Arrange for kick-off meeting and review with all departments asking for date-wise schedule for their area of activities.					
8.	Arrange project inputs like drawings, specifications and technical details on time for consistent execution.					
9.	Regular monitoring of critical path activities for schedule updating according to actual.					
10.	Prepare a list of responsibilities to all parties involved in the project.					
11.	Reschedule the sequence of onsite work in case of changes in requirement from client side appear during implementation.					
12.	Conduct regular meetings to review the project, and minutes writing down.					
13.	Analyze the project performances on time, detecting variances from the schedule and dealing with their effects considering cash flow, and take corrective action.					
14.	Keep joint records of owner-supplied materials along with their scheduled delivery dates and actual receipt date.					
15.	Keep joint records of breakdown time of nonworking days due to adverse weather conditions and obstacles by donor/owner.					
16.	Arrange for timely carrying out of all tests for inspections and approval by the supervisor/consultant.					
17.	Track handover of completed work (such as completed sections, finished parts of project for client use, etc.).					
18.	Contribute in determination of the variation orders duration, to consider its effect on the others.					

2- Duties related to resources management and team building:

No.	Resources Management and team building Duties	Important Degree				
		Very Important	Important	Moderate	Not Important	Least Important
1.	Arrange/ distribute resources, tracking its effect on the productivity in the real implementation.					
2.	Arrange all resources and equipment's for on the project activates according to owner/donor priorities.					
3.	Revise ordering material accordingly, based on the project scheduling and the quantity in the storage, to be in time and minimize storage as possible.					
4.	Take care on the dimensions and shapes of the design items to be adequate with the standardized sizes and dimensions to minimize waste.					
5.	Minimize materials holding and transportation process as possible to reduced damages and loss in material "block tiles".					
6.	Check the items dimensions and shapes before installation to prevent defect installation and rework.					
7.	Quantifying waste in material and comparison the quantity, if within acceptable range or not to take corrective actions.					
8.	Care for works of others by making staff and workmen aware of their responsibilities.					
9.	Proper tasks allocating to the available human resources for the project, to achieve the needed productivity.					
10.	Arrange performance and technical training of human resources in the long term projects.					
11.	Spread the cooperation culture between employees.					
12.	Spread delegation culture to appropriate project team especially on the site for quick decision.					
13.	Ensure discipline among all employees, so everyone knows what he/she will do.					
14.	Resolve differences/conflicts/confusion among participants.					
15.	Motivate project participants to achieve the planned productivity rate.					
16.	Develop a team spirit and accept suggesting input from all participants.					
17.	Establishing and maintaining an effective organizational structure.					
18.	Open a wide and fast communication channels between all parties "structure or un-structure".					
19.	Act as liaison between all constructions parties to facilitate the communication.					

3- Duties related to contract implementation:

No.	Contract Implementation Duties	Important Degree				
		Very Important	Important	Moderate	Not Important	Least Important
1.	Check/ follow up the implementation of all contractual commitments.					
2.	Explain and support the work of nominated subcontractors and specialist suppliers from owner/ donor, as in contract.					
3.	Identify defects, deficiencies, ambiguities and conflicts in tender documents "drawings/specifications..." and having them resolved, within contract frame.					
4.	Improving and altering activities and considering better alternatives that efficiently meet the project contract constraints, as time, cost and quality.					
5.	Provide an organized information gathering and archives as wariness from future claims.					
6.	Keeping joint records of all input cost (viz. labor, material, plant, etc.) for non-tendered items to control the variations.					
7.	Act as liaison with specialist consultants, specialist subcontractors, nominated subcontractors, etc., as in contractual relationship.					
8.	Maintain proper contractual relationships with consultant and the contractor.					
9.	Contribute in determination the contractual relationship of the project as material and drawing approval responsibilities during the implementation.					
10.	Contribute in determination the responsible person for every party in project "contractor, consultant, owner...."					
11.	Contribute in determination the subtraction conditions of the project.					
12.	Contribute in variation orders approval, considering the other parties rights.					
13.	Contact outside authorities for logistic facilities as closing road or stopping water supplies.					

4- Duties related to quality and performance:

No.	Quality and Performance Duties	Important Degree				
		Very Important	Important	Moderate	Not Important	Least Important
1.	Arrange carrying out of all tests for inspections by the supervision/consultant and maintaining records of the results.					
2.	Arrange submission of materials samples for approval by the supervision/ consultant, considering other parties reservedly.					
3.	Prepare a project quality assurance plan in line with contract specification.					
4.	Monitor quality level, and has a power to stop the defect works.					
5.	Propose remedial work methods and programs for execution in case of defects or damages.					
6.	Follow up with offsite fabricators for any reason, if it's within the acceptable quality range.					
7.	Contact outside authorities for testing, inspection and results.					
8.	Contribute in approval of quality measurement plan for all project stages.					
9.	Survey the updated materials available in the market to be ready for any contractor plea as unavailability/ closure.					

5- Duties related to budget and cash flow:

No.	Budget and Cash flow Duties	Important Degree				
		Very Important	Important	Moderate	Not Important	Least Important
1.	Contribute in determining the project objectives within budget limitation.					
2.	Find new alternatives for the same function with less cost.					
3.	Find new alternatives with higher specifications with small incremental cost.					
4.	Contribute in the determination of the budget of the project phases, and the overall budget.					
5.	Communicate financial status, documents and changes, etc., to all relevant participants.					
6.	Monitoring cost of all activities and taking corrective action.					
7.	Keep joint records of quantities of work done especially of the work that is to be covered up, for any disputes.					
8.	Facilitate payments to contractor and subcontractors					
9.	Make the payments consistent with the work progress state, donor financial state and contractor liquidity.					
10.	Contribute in determination of the variation orders direct cost, and its effect on the overall budget.					

6- Duties related to health and safety:

No.	Health and safety duties	Important Degree				
		Very Important	Important	Moderate	Not Important	Least Important
1.	Consider safety regulations from design stage, to grantee safe implementation.					
2.	Contribute in preparing safety program for the dangerous work implementation, especially risky works.					
3.	Check the availability of personal protective equipment as needed for the site team.					
4.	Arrange and manage regular safety meeting.					
5.	Assign the dangers and hazard tasks at the project beginning.					
6.	Monitor the application of all safety regulations related to dangerous works.					
7.	Prepare regular safety report from his/her monitoring.					
8.	Take action/quick decision in case of safety regulation violation					
9.	Check the first aids tools availability and its readiness.					
10.	Inform all related parties "donor, owner, insurance company..." in case of accidents.					

Part III: Questions related to the attributes of coordination in Gaza projects:

1- Attributes related to personal:

No	Personal attributes	Important Degree				
		Very Important	Important	Moderate	Not Important	Least Important
1.	Has sharp charisma and independence in his decision.					
2.	Always meets deadlines for works handing over.					
3.	Has a physiognomy in prediction and planning.					
4.	Respects the others opinions in spite of the difference from his point of view.					
5.	Apologizes when he/she has mistaken.					
6.	Understands the others excuses in case of apologies.					
7.	Understands human psychology, so he/she can deal with different cultures.					
8.	Concerned for the conciliation from his/her direct supervisor and the top management.					
9.	Concerned for other's ego, so he/she makes them feel satisfied.					
10.	His/her age is in certain age group.					
11.	What others "project parties" say about him/her.					
12.	Has a diplomatic character, so he/she can persuade.					

2- Attributes related to technical:

No.	Technical attributes	Important Degree				
		Very Important	Important	Moderate	Not Important	Least Important
1.	His/her technical knowledge about the main subject of the work "pavements in roads, pumps in wells".					
2.	His/her experience in the type of project works or nearest track.					
3.	Familiar with measuring methods and evaluation criteria's in similar projects/contracts.					
4.	His knowledge of project finance, taxes laws and budget limitations.					
5.	Reliance on systematic approach, as a result of his/her deep technical knowledge "reasons/results".					

3- Attributes related to education and gained skills:

No.	Education and Gained skills	Important Degree				
		Very Important	Important	Moderate	Not Important	Least Important
1.	Has a civil /architect engineering, planning, certification or a related field.					
2.	Familiar with problem solving "negotiation, arbitration, courts" and managing the parties relations "duties and right.					
3.	Has liaison skill, with being attractive and using all contact approach and communication skill professionally.					
4.	Cleverness planner with accurate result in case of forecasting.					
5.	Has resources management skills, efficiently and optimally.					
6.	Has computer modern software's application professionalism					

3- Attributes related to coordination integrity:

No.	Coordination integrity	Important Degree				
		Very Important	Important	Moderate	Not Important	Least Important
1.	His/her integrity to the project, work interest and relationship between parties.					
2.	If the coordinator biased for party/his employer.					
3.	If the coordinator looking for working for party other than his current employer.					
4.	The employer violates the coordinator rights					
5.	If the coordinator feels unsatisfied on his/her current work from "money or respect"					
6.	The coordinator not just done his/her work, but he looks for improving and developing the work environment.					

ANNEX 2: Arabic Questionnaire

The Islamic University –
Gaza

Higher Education Deanship

Faculty of Engineering
Construction Management



الجامعة الإسلامية – غزة

عمادة الدراسات العليا

كلية الهندسة – إدارة التشييد

استبانة حول

مسؤوليات و صفات التنسيق في المشاريع الإنشائية في قطاع غزة

الأخ المهندس/ الأخت المهندسة

يعتبر التنسيق خط الحياة النابض في إدارة المشاريع الإنشائية. وأحد أهم العمليات حساسية في طريق نجاح المشروع لأنه يؤثر في كل الوظائف الإدارية للمشاريع الإنشائية، لذا يعد التنسيق جوهر العملية الادارية في المشاريع الإنشائية.

نرجو من سيادتكم تعبئة الاستبانة المرفقة بالمعلومات المطلوبة، و التي تهدف إلى تحديد الواجبات و المسؤوليات لمنسق المشروع، و الصفات التي يجب أن يتميز بها المنسق في المشاريع الإنشائية، فيما يتعلق بما يلي :

أولاً/ أسئلة عامة تتعلق بمعبئ الإستبانة .

١. مسؤوليات التخطيط و الجدولة .
٢. مسؤوليات إدارة المصادر و تعزيز الفريق .
٣. مسؤوليات تعاقدية .
٤. مسؤوليات تتعلق بالجودة و حسن الأداء.
٥. مسؤوليات تتعلق بالموازنة و التدفقات المالية.
٦. مسؤوليات الصحة و الأمان في الإنشاءات.

ثانياً/ أسئلة تتعلق بواجبات و مسؤوليات المنسق :

١. صفات شخصية .
٢. صفات فنية .
٣. مميزات خاصة بالتعليم و المهارات المكتسبة .
٤. صفات خاصة بالصلاحيات و الاخلاص .

علماً بأن هذه الدراسة هي جزء من البحث التكميلي لنيل درجة الماجستير في إدارة المشاريع الهندسية، للباحث المهندس / وسام صلاح العالول ، تحت إشراف البروفسور / عدنان إنشاصي .

وإنني أثنى جهدكم وإجاباتكم على الأسئلة المطروحة في الاستبيان، علماً بأن جميع المعلومات التي يتم الحصول عليها منكم سوف تستخدم لغرض الدراسة العلمية البحتة بهدف التطوير وسوف تعامل بسرية.

أشكر سيادتكم على التعاون وتقبلوا فائق الاحترام والتقدير

الباحث / م. وسام صلاح العالول

ديسمبر، ٢٠١١

أولاً/ أسئلة عامة تتعلق بمعبئ الإستبانة

(ملاحظة/ يرجى اختيار اجابة واحدة في كل فقرة)

٩. الموقع الوظيفي :

- مدير مشروع
 مهندس موقع (مشرف/مقاول)
 منسق مشروع
 مهندس مكتب

١٠. سنوات الخبرة :

- ٣ سنوات أو أقل
 ١٠-٦ سنوات
 ٤-٥ سنوات
 ١١ سنة أو أكثر

١١. الدرجة العلمية :

- بكالوريوس
 ماجستير
 أخرى

١٢. تصنيف المؤسسة التي تعمل بها :

- حكومية
 بلدية
 غير حكومية
 جامعة
 دولية
 قطاع خاص

١٣. صفة المؤسسة التي تعمل بها :

- مانحة/داعمة
 مالك
 مقاول
 أخرى

١٤. عدد الموظفين في المؤسسة :

- ٥ موظفين أو أقل
 ١١ - ١٥ موظف
 ٦ - ١٠ موظفين
 أكثر من ١٥ موظف

١٥. عدد المشاريع التي نفذت خلال آخر خمس سنوات :

- ٥ مشاريع أو أقل
 ١٠-٢٠ مشروع
 ٥ - ١٠ مشروع
 أكثر من ٢٠ مشروع

١٦. حجم المشاريع المنفذة خلال اخر خمس سنوات :

- أقل من مليون دولار
 ٣-٥ ملايين دولار
 ١-٣ مليون دولار
 أكثر من ٥ مليون دولار

ثانياً/ أسئلة تتعلق بواجبات و مسؤوليات المنسق :

الفقرات التالية عبارة عن مسؤوليات و واجبات مقترحة لمنسق المشروع ،مقسمة إلى مجموعات حسب النوع. يرجى من معي الاستبيان اختيار درجة الأهمية لكل فقرة حسب ما يراه مناسب من وجهة نظرة و واقع خبرته.

١- مسؤوليات متعلقة التخطيط و الجدولة:

No.	مسؤوليات التخطيط و الجدولة	درجة الأهمية				
		مهم جداً	مهم	الأهمية المتوسطة	غير مهم	أقل أهمية
١.	المساهمة في إعداد الخطة لتحضير و تنفيذ و متابعة المشروع.					
٢.	المساهمة في تحديد الفترات الزمنية لمراحل المشروع، و المدة الكلية له.					
٣.	إعداد تقرير عن تقدم المشروع، كما هو مطلوب لتتبع سير المشروع في كل مرحلة.					
٤.	المتابعة المستمرة لتوزيع العمل علي جميع الأطراف (تصميم، اعداد عطاء، ترسية، اشراف...) حسب التخطيط.					
٥.	إبلاغ جميع الأطراف (الممول، المالك، المقاول) بالمعلومات التي يجب ان تكون معروفة لديهم (مثل /آخر موعد، بداية عمل).					
٦.	تحديد النشاطات الواقعة علي المسار الحرج في الجدول الزمني، و مراعاة حساسيتها.					
٧.	ترتيب الاجتماع التمهيدي بالتعاون مع جميع الأطراف المعنية بشكل مجدول يتناسب مع مسؤولياتهم في المشروع.					
٨.	ترتيب و تجميع كافة مدخلات المشروع من مخططات و مواصفات و تفاصيل فنية في الوقت المطلوب لتيسير تنفيذ المشروع.					
٩.	مراقبة مستمرة للنشاطات الحرجة، و تحديث الجدول الزمني حسب المتغيرات الواقعية.					
١٠.	إعداد قائمة تفصيلية لمسؤوليات كل جهة في المشروع (الممول، المالك، المقاول).					
١١.	إعادة جدولة المشروع بناء علي المتغيرات الموقعية غير المنظورة أثناء مرحلة التخطيط أو حسب متطلبات المالك .					
١٢.	تنظيم إجتماعات منتظمة لمراجعة و متابعة سير المشروع، و تدوين محاضر الإجتماعات.					
١٣.	تحليل تقدم المشروع الزمني بالمقارنة بحجم الانجاز و التدفق المالي و تحديد إجراء في حالة عدم التناسب.					
١٤.	تحديد مواعيد توريد مواد خاصة من قبل المالك/ الممول، و اعلام المقاول بمواعيدها/كمية.					
١٥.	حصر و تحديد ايام التوقف عن العمل بسبب الاحوال الجوية/ اعاقه من قبل المالك/ الممول...					
١٦.	تنظيم مواعيد اجراء الفحوصات و اعتمادها من قبل المشرف/ الاستشاري و ابلاغ جميع الجهات المعنية بالنتائج.					
١٧.	متابعة تسليم الأعمال المنهية(اقسام مستشفى انهيت أعمالها و المالك بحاجة لها) بالتنسيق مع للجهات المعنية ، و تحديد المسئولية عن الأعمال المنهية.					
١٨.	المساهمة في تحديد المدة الزمنية للأوامر التغييرية في المشروع، لأخذ تأثير ذلك علي الجهات الأخرى.					

٢ - مسؤوليات متعلقة بإدارة المصادر و تعزيز الفريق :

No.	مسؤوليات إدارة المصادر و تعزيز الفريق	درجة الأهمية				
		مهم جداً	مهم	متوسط الأهمية	غير مهم	أقل أهمية
١.	تنظيم وتوزيع المصادر، و تتبع أثر ذلك علي الإنتاجية في تنفيذ المشروع.					
٢.	تنظيم توزيع المعدات و المصادر علي نشاطات المشروع بناء علي أولويات المالك/ الممول.					
٣.	مراجعة طلبيات المواد بشكل دوري بناء علي جدولة النشاطات بالنسبة للكميات المخزنة، لتكون وقت استخدامها بالضبط و تقليل عملية التخزين قدر الإمكان.					
٤.	الإهتمام بمقاسات و أكال العناصر في المشروع أثناء مرحلة التصميم لتناسب مع المقاسات و الأشكال القياسية لتقليل الفوائد عند التنفيذ.					
٥.	تقليل عملية حمل و نقل المواد قدر الإمكان للحد من التفسير و الفوائد "البلوك و البلاط"					
٦.	فحص العناصر و الأجزاء قبل تركيبها لمنع عملية الفك و إعادة التركيب لقليل الفوائد في المواد و الجهد.					
٧.	حصر كميات الفوائد الفعلية أثناء التنفيذ و مقارنتها بالمعدل المقبول و أخذ أي إجراء يلزم.					
٨.	الإهتمام بأولويات و إمكانات كل الأطراف أثنار توزيع المسؤوليات علي فرقهم.					
٩.	تحديد و تخصيص المصادر البشرية و المواد و المعدات المتلائمة مع متطلبات المشروع.					
١٠.	تدريب/تنظيم تدريب للمصادر البشرية في حال المشاريع طويلة الأمد أو للصيانة.					
١١.	نشر و تعزيز ثقافة التعاون و تبادل الخبرات بين الفرق العاملة.					
١٢.	نشر و تعزيز ثقافة التفويض و توزيع الصلاحيات علي الفريق العامل و خاصة في الموقع.					
١٣.	التأكيد علي الإنضباط بين العاملين، بحيث يعرف كل شخص عمله.					
١٤.	حل النزاعات و الخلافات التي تطرأ و تسهيل الصعوبات بين أطراف المشروع.					
١٥.	تحفيز و حث أطراف المشروع لتحقيق معدل الإنتاجية المخطط له.					
١٦.	تعزيز روح العمل الجماعي و تلقي الاسهامات البناءة من جميع أطراف المشروع.					
١٧.	استحداث و تطوير هيكل تنظيمي فعال يضمن الإتصال الفاعل بين جميع أطراف المشروع.					
١٨.	فتح و بناء قنوات اتصال سريعة و واسعة بين جميع أطراف المشروع (رسمية/غير رسمية).					
١٩.	العمل كحلقة وصل بين أطراف المشروع بحيادية ، لتقريب و جهات النظر و الوصول إلى أهداف مشتركة.					

٣- مسؤوليات متعلقة بالعلاقة التعاقدية

درجة الأهمية					مسؤوليات تعاقدية	No.
أقل أهمية	غير مهم	متوسط الأهمية	مهم	مهم جداً		
					متابعة تطبيق كل بنود و متطلبات العقد الذي ينظم العلاقة بين الأطراف في المشروع.	١.
					توضيح و تسهيل عمل المقاولين الفرعيين و الموردين المتخصصين المسمون من قبل أحد الأطراف "المالك/ الممول" كما في العقد.	٢.
					تحديد و مراعاة الإختلافات و التضارب في المعلومات بين وثائق العقد "مخططات، مواصفات، جداول كميات" و حلها في إطار العقد الرئيسي.	٣.
					معالجة و تحسين تنفيذ النشاطات بتطبيق خيارات أكثر فاعلية لتتوافق مع محددات العقد "الوقت ، التكلفة، الجودة"	٤.
					تنظيم و أرشفة كافة المعلومات أثناء تنفيذ المشروع ، خوفاً من أي مطالبة مستقبلية.	٥.
					تنظيم و أرشفة كافة المتغيرات الجديدة في تكاليف المشروع في بنود غير تعاقدية لتنظيم الأوامر التغييرية.	٦.
					العمل كحلقة وصل بين الإستشارين و الخبراء و المقاولين الفرعيين المسمون من و تنظيم علاقاتهم التعاقدية "اتخاذ القرارات و الإعتمادات"	٧.
					مراقبة و معالجة العلاقة التعاقدية الحساسة بين المقاول و الاستشاري	٨.
					المساهمة في تحديد طبيعة العلاقة التعاقدية و تحديد المسؤوليات مثل اعتماد المواد و المخططات اثناء تنفيذ المشروع.	٩.
					المساهمة في تحديد الشخص المسؤول في كل طرف من أطراف العقد "مقاول، استشاري، مالك...."	١٠.
					المساهمة في تحديد الخصومات و الشروط الجزائية في العقد.	١١.
					المساهمة في إعتماد الأوامر التغييرية لمراعاة إهتامات كافة الأطراف.	١٢.
					التواصل مع أي سلطات خارج نطاق المشروع لتسهيل الأمور اللوجستية "إغلاق الطرق، قطع و وصل خطوط المياه العامة...."	١٣.

٤ - مسؤوليات تتعلق بالجودة و حسن الأداء

درجة الأهمية					مسؤوليات الجودة و حسن الأداء	No.
أقل أهمية	غير مهم	متوسط الأهمية	مهم	مهم جداً		
					تنظيم اجراء الفحوصات و الإختبارات بالتنسيق مع الاستشاري/ المشرف و أرشفة النتائج.	١.
					تنظيم تسليم عينات لإعتماد المواد إلى الاستشاري/ المشرف و اعتبار تحفظات باقي الأطراف علي عملية الإعتماد.	٢.
					اعداد خطة لتنظيم تأكيد الجودة أثناء تنفيذ المشروع حسب مواصفات المشروع.	٣.
					مراقبة مستوى الجودة أثناء تنفيذ المشروع، مع القدرة علي إيقاف العمل في حال تدني مستوي الجودة.	٤.
					إقتراح طرق تنفيذ جديدة في حال التنفيذ متدني الجودة، للوصول للمستوي المطلوب.	٥.
					متابعة التجاوزات التي تحدث أثناء تنفيذ المشروع لأي سبب، هل هي ضمن المستوي المقبول في الجودة/ يؤثر علي أداء الوظيفي للعمل.	٦.
					التواصل مع الجهات خارج اطار المشروع "مختبرات الفحص" للبحث عن أفضل طرق قياس الجودة.	٧.
					المساهمة في اعداد خطة لقياس الجودة أثناء تنفيذ المشروع	٨.
					الإطلاع و مسح السوق المحلية للتعرف علي مواد الانشاء المتوفرة، لابطال حجة عدم التوفر/ إغلاق.	٩.

٥ - مسؤوليات متعلقة بالموازنة و التدفقات المالية

درجة الأهمية					مسؤوليات الموازنة و التدفقات المالية	No.
أقل أهمية	غير مهم	متوسط الأهمية	مهم	مهم جداً		
					المشاركة في تحديد أهداف المشروع ضمن حدود الموازنة المرصودة من بداية المشروع.	١.
					إيجاد / توفير بدائل جديدة تؤدي نفس الوظيفة و لكن بسعر أقل.	٢.
					إيجاد / توفير بدائل بمواصفات و جودة أعلى و لكن بزيادة بسيطة في التكلفة.	٣.
					المساهمة في توزيع الموازنة علي مراحل المشروع، ضمن الموازنة الرئيسية.	٤.
					التواصل و إشعار كل الأطراف المعنية بالتغيرات المالية الملزمة بالمشروع علي شكل مستندات.	٥.
					مراقبة مستمرة للموازنة و المصروفات بالمقارنة مع ما هو مخطط، و أخذ الإجراءات التعديلية.	٦.

درجة الأهمية					مسؤوليات الموازنة و التدفقات المالية	No.
أقل أهمية	غير مهم	متوسط الأهمية	مهم	مهم جداً		
					حصر و أرشفة الأعمال العالقة خاصة التي سوف تغطي " عزل قواعد مثلاً"	.٧
					لمعالجة اي خلاف مالي ينتج عنها.	
					تسهيل/تسريع عمليات الدفع للمقاول و المقاولين الفرعين...	.٨
					جعل تدفق الدفعات يتناسب مع تقدم حجم العمل الفعلي/ الوضع المالي للمانح/ سيولة المقاول.	.٩
					المساهمة في تحديد التكاليف المباشرة للأوامر التغييرية و تأثير ذلك علي الميزانية العامة للمشروع.	.١٠

٦- مسؤوليات تتعلق بالصحة و الأمان في الإنشاءات

درجة الأهمية					مسؤوليات الصحة و الأمان في الإنشاءات	No.
أقل أهمية	غير مهم	متوسط الأهمية	مهم	مهم جداً		
					الإهتمام و متابعة قوانين الأمان و السلامة منذ مرحلة التصميم ، لضمان التنفيذ الأمان للأعمال.	.١
					المساهمة في إعداد برنامج و خطة الأمان أثناء تنفيذ المشروع و خاصة للأعمال الخطيرة.	.٢
					التأكد و فحص توفر أدوات الحماية و الأمان في موقع العمل لكل الطواقم.	.٣
					تنظيم و إدارة إجتماعات مناقشة قضايا الصحة و الأمان في المشروع.	.٤
					تحديد الأنشطة الخطرة من بداية المشروع وإعطائها الاهتمام الكافي.	.٥
					مراقبة تطبيق معايير و أنظمة الصحة و الأمان في تنفيذ المشاريع.	.٦
					إعداد تقارير دورية عن الأمان و السلامة من خلال المراقبة الفعلية لتنفيذ الأعمال.	.٧
					أخذ قرار و إجراء سريع في حال انتهاك أي من أنظمة و تعليمات الصحة و الأمان في المنشآت.	.٨
					التأكد و فحص وجود أدوات الإسعافات الأولية في الموقع و جاهزيتها للاستخدام	.٩
					إعلام كل الأطراف المعنية "الممول، المالك، شركة التأمين" في حال حدوث حادث لأي من العاملين في الموقع.	.١٠

ثالثاً/ أسئلة تتعلق بصفات المنسق :

الفقرات التالية عبارة عن صفات مقترحة لمنسق المشروع ،مقسمة إلى مجموعات حسب النوع. يرجى من معبئ الاستبيان اختيار درجة الأهمية لكل فقرة حسب ما يراه مناسب من وجهة نظره و واقع خبرته العملية.

١- صفات تتعلق بالشخصية

درجة الأهمية					صفات شخصية	No.
أقل أهمية	غير مهم	متوسط الأهمية	مهم	مهم جداً		
					لديه/ها شخصية قوية و استقلالية في القرار.	١.
					دائماً يلتزم بمواعيد التسليم و انجاز الأعمال قبل اخر موعد لها.	٢.
					لديه/ها فراسة و حسن توقع أثناء التخطيط.	٣.
					احترام آراء الآخرين علي الرغم من مخالفتها لرأيه "حيادية"	٤.
					لديه/ها القدرة علي الإعتذار أمام الآخرين في حال صدور خطأ منه/ها.	٥.
					لديه/ها القدرة علي مسامحة الآخرين في حال صدور تقصير منهم.	٦.
					لديه/ها المقدره علي تفهم نفسيات الآخرين، و التعامل مع كافة الثقافات المختلفة.	٧.
					يهتم/تهتم برضاء المشرفين المباشرين و الإدارة العليا عنه/ها.	٨.
					يهتم/تهتم لشعور الآخرين و يحقق الرضا لديهم و تحقيق الذات.	٩.
					يكون/ تكون ضمن فئة عمرية معينة.	١٠.
					آراء الآخرين فيه ، أطراف المشروع " مثل المالك و المقاول..."	١١.
					لديه/ها شخصية دبلوماسية تكسبه القدرة العالية علي الإقناع.	١٢.

٢- صفات تتعلق بالناحية فنية

درجة الأهمية					صفات فنية	No.
أقل أهمية	غير مهم	متوسط الأهمية	مهم	مهم جداً		
					المعرفة الفنية حول موضع العمل الرئيسي في المشروع "الرصافات في الطرق، المضخات في الآبار"	١.
					سنوات الخبرة السابقة في مشاريع مشابهة أو نفس نوع المشروع.	٢.
					معتاد علي طرق القياس و معايير التقييم في مشاريع/عقود مشابه.	٣.
					المعرفة في الأمور و المعاملات المالية مثل قوانين الضرائب و محددات الموازنة	٤.
					لديه/ها منهجه فنية من خلال خبراته الفنية العميقة في معالجة المشاكل غير الاعتيادية "الأسباب و النتائج"	٥.

٣- مميزات خاصة بالتعليم و المهارات المكتسبة

درجة الأهمية					مميزات التعليم و المهارات المكتسبة	No.
أقل أهمية	غير مهم	متوسط الأهمية	مهم	مهم جداً		
					لديه/ها شهادة في مجال الهندسة المدنية/ المعمارية، إدارة المشروعات/ التخطيط.	١.
					معتاد علي العقبات القانونية و طرق حلها "تفاوض، تحكيم، قضاء" و إدارة العلاقات بين أطراف التعاقد "الحقوق و الواجبات"	٢.
					لديه/ها مهارة الإتصال و التواصل بشكل يجذب انتباه الآخرين و نقل المعلومة بشكل مناسب.	٣.
					لديه/ها مهارة التنبؤ بنتائج دقيقة في ظل معطيات المشروع.	٤.
					لديه/ها مهارة إدارة المصادر بالشكل الأمثل و الأكثر كفاءة.	٥.
					لديه/ها إحترافية في استخدام برامج الحاسوب و تطبيقاته العصرية.	٦.

٤- صفات خاصة بالصلاحيات و الاخلاص

درجة الأهمية					صفات الصلاحيات و الاخلاص	No.
أقل أهمية	غير مهم	متوسط الأهمية	مهم	مهم جداً		
					يكون/تكون منتمياً و مخلصاً للمشروع و مصلحة العمل و علاقة الأطراف مع بعضها.	١.
					يكون/تكون منحازاً إلى أحد أطراف المشروع/ المشغل له.	٢.
					يتطلع/تتطلع للعمل مع أحد أطراف المشروع غير المشغل الحالي.	٣.
					المشغل الحالي ينتهك/لا يراعي حقوقه/ها	٤.
					يشعر/تشعر بحالة غير رضي عن العمل و عدم تحقيق الذات " مالياً ، مادياً"	٥.
					يتطلع/تتطلع دائماً لتحسين و تطوير بيئة العمل المحيطة به و ليس فقط اداء العمل بأي طريقة.	٦.