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Factors Affecting the Performance of Construction Projects in the Gaza Strip

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A Thesis Submitted in Partial Fulfillment of the Requirements for Degree of Master of Science in Construction Management

The Islamic University of Gaza – Palestine

April, 2008

Abstract

Construction industry has complexity in its nature because it contains large number of parties as clients, contractors, consultants, stakeholders, shareholders, regulators and others. Construction projects in the Gaza Strip suffer from many problems and complex issues in performance such as cost, time and safety. The aim of this thesis is to identify and evaluate the main factors affecting the performance of construction projects in the Gaza strip.

Literature review about performance was reviewed to identify the factors affecting the performance of construction projects. In addition, other local factors have been added as recommended by local experts. Pilot study of the questionnaire was achieved by a scouting sample, which consisted of 30 questionnaires. A questionnaire survey was conducted and 63 factors were identified, categorized into 10 groups, evaluated and ranked from owners, consultants and constructors perspectives. 120 questionnaires were distributed as follows: 25 to owners, 35 to consultants and 60 to contractors. 88 questionnaires were received (73%) as follows: 17 (70%) from owners, 25 (72%) from consultants and 46 (77%) from contractors as respondents. The most important factors agreed by the owners, consultants and contractors were: average delay because of closures and materials shortage; availability of resources as planned through project duration; leadership skills for project manager; escalation of material prices; availability of personals with high experience and qualification; and quality of equipments and raw materials in project.

The degree of agreement between parties regarding the ranking of factors was determined according to Kendall's Coefficient of Concordance. For Cost, Time, Quality, Productivity, Client Satisfaction, People, Innovation and learning factors, and all groups together, there is a significant degree of agreement among the owners, consultants and contractors. On the other hand, for Regular and community satisfaction, Health and Safety, and Environment factors, there is disagreement of agreement among the owners, consultants and contractors.

The practices concerning with the Key Performance Indicators (KPIs) such as time, cost, project owner satisfaction and safety checklists were analyzed in order to know

the main practical problems of projects performance in the Gaza Strip and then to formulate recommendations to improve performance of construction projects in the Gaza Strip. It was concluded that projects were delayed and the actual cost of projects was more than the estimated cost because of Gaza strip political conditions. Overall project safety factors had been moderately implemented in construction organizations.

It is recommended for construction organizations to have a clear mission and vision to formulate, implement and evaluate their performance. A structured methodology and technique should be identified to overcome the effect of local political and economic situations on the performance of construction projects in the Gaza Strip. In addition, it is recommended to develop human resources in the construction industry through proper and continuous training programs about construction projects performance. It is necessary for construction organizations in Gaza Strip to evaluate both of market share and liquidity before implementation of any construction project because of difficult economic situation. All of that will assist organizations to perform projects successfully and strongly.

ملخص الدراسة

يعتبر قطاع الإنشاءات بأنه ذو طابع معقد لأنه يتعامل مع العديد من الأطراف كالمالكين، المقاولين، الاستشاريين، المساهمين، وغيرهم. لذلك تعاني المشاريع الإنشائية في قطاع غزة من العديد من المشاكل والقضايا المعقدة من حيث الأداء. إن الهدف هذه الدراسة هو تحديد وتحليل العوامل المؤثرة على الأداء في المشاريع الإنشائية في قطاع غزة.

تمت مراجعة الدراسات السابقة لتحديد العوامل المؤثرة على الأداء في المشاريع الإنشائية في قطاع غزة. كما تمت إضافة عوامل أخرى لها علاقة بالوضع المحلي في قطاع غزة وذلك بناء على آراء خبراء محليين. كما تم عمل اختبار للاستبيان بتوزيعه على ثلاثين عينة وتم عمل التعديلات اللازمة. شمل الاستبيان ثلاثة وستين عاملا تم توزيعهم على عشرة مجموعات، كما تم تحليل الاستبيان من وجهة نظر المالك والمقاول والاستشاري. تم توزيع الاستبيان على مئة وعشرين عينة كالتالي: 25 لفئة المالك، 35 لفئة الاستشاري ، 60 لفئة المقاول. تم استقبال ثمانية وثمانين استبيان كالتالي: 17 من فئة المالك، 25 من فئة الاستشاري ، 46 من فئة المقاول. أظهرت النتائج التوافق بين المالك والاستشاري والمقاول في أن أهم العوامل المؤثرة على أداء المشاريع الإنشائية في قطاع غزة هي كالتالي: معدل التأخير بسبب إغلاق المعابر وقلة المواد، توفر الموارد كما هو مخطط له وحسب مدة المشروع، المهارات القيادية لمدير المشروع، ارتفاع أسعار المواد، وجود الأشخاص ذوي الكفاءة والخبرة العالية، وجودة المواد الخام و المعدات المستخدمة في المشروع.

تمت دراسة مدى التوافق بين الثلاث فئات (المالك والاستشاري والمقاول) بالنسبة لترتيب العوامل المؤثرة على الأداء في المشاريع الإنشائية في قطاع غزة. أظهرت النتائج بأنه كان هناك توافق بين المالك والاستشاري والمقاول بالنسبة لترتيب ومدى أهمية كل من العوامل التالية: التكلفة، الوقت، الجودة، الإنتاجية، إرضاء المالك، الأفراد، التجديد والتعليم والتدريب (التطوير). على العكس من ذلك، أظهرت النتائج بأنه لم يكن هناك توافق بين المالك والاستشاري والمقاول بالنسبة لترتيب ومدى أهمية كل من العوامل التالية: إرضاء الأنظمة والمجتمع، السلامة والأمان، البيئة.

بالإضافة لذلك تمت دراسة التطبيقات المتعلقة بالعوامل المؤثرة على أداء المشاريع الإنشائية في قطاع غزة كالوقت والتكلفة وإرضاء المالك والسلامة، حيث تم تحليل هذه التطبيقات لمعرفة وتحديد أهم المشاكل العملية التي تواجهها المشاريع الإنشائية في قطاع غزة من حيث الأداء. أظهرت النتائج أن العديد من المشاريع الإنشائية تأخرت كما أن التكلفة الفعلية لها زادت عن التكلفة التقديرية بسبب الأوضاع السياسية الراهنة في قطاع غزة. كما أن عوامل السلامة أحيانا ما تطبق في المشاريع الإنشائية.

بناء على الدراسة ينصح بأن تمتلك مؤسسات قطاع الإنشاءات رؤية ورسالة واضحة لتحديد وتنفيذ وتقييم الأداء الخاص بها. كما يجب وضع طريقة ووسيلة ممنهجة للتغلب على تأثير الأوضاع السياسية والاقتصادية على أداء المشاريع الإنشائية في قطاع غزة. كما يجب تطوير الموارد البشرية من خلال برامج تدريبية مناسبة ومستمرة فيما يتعلق بأداء المشاريع الإنشائية في قطاع غزة. كما أنه من الضروري لمؤسسات قطاع

الإنشاءات من تقييم الوضع المالي لها وحجم مشاركتها في السوق المحلي قبل البدء بتنفيذ أي مشروع إنشائي وذلك بسبب الأوضاع والظروف الاقتصادية الصعبة في قطاع غزة. كل ذلك سيساعد مؤسسات قطاع الإنشاءات لإنجاز المشاريع بنجاح وفعالية.

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List of Abbreviations

AEC	Architectural, Engineering and Construction
AHP	Analytical Hierarchical Process
APPC	Automated Project Performance Control System
B.O.Q	Bill of Quantity
BPM	Building Project Management
CPI	Cost Performance Index
CTP	Construction Time Performance
ECI	Early Contractor Involvement
EPS	Environmental Performance Score
ESI	Early Supplier Involvement
GNP	Gross National Product
IT	Information Technology
KPIs	Key Performance Indicators
MCDA	Multi Criteria Decision Analysis
PA	Palestinian Authority
PAR	Performance Appraisal and Reporting
PM	Project Management
PMP	Project Management Performance
PPE	Project Performance Evaluation
PPI	Project Performance Indicators
PPMS	Project Performance Monitoring System
SPI	Schedule Performance Index
RII	Relative Importance Index
WB$G	West Bank and Gaza

CHAPTER 1

INTRODUCTION

1.1 Introduction

Construction industry plays a major role in development and achievement the goals of society. Construction is one of the largest industries and contributes to about 10% of the gross national product (GNP) in industrialized countries (Navon, 2005). Construction industry has complexity in its nature because it contains large number of parties as clients, contractors, consultants, stakeholders, shareholders and regulators. The performance of the construction industry is affected by national economies (Navon, 2005).

In Palestine, efficient construction projects can provide a solid platform for reviving the Palestinian economy and for building a more balance and independent economy during stable political conditions. In 1993, neglect of such systems, services, and institutions, however, has harmed the quality of life of Palestinians and their health and environment. However, project performance in Palestine has suffered since conflict erupted in September 2000 after the breakdown in Israel-Palestinian negotiation on permanent-status issues. This has led to closures and tight restrictions on movement of people and goods in West Bank and Gaza resulting in a dramatic decline in trade, investment, and employment. In addition this has prevented the planned implementation and has caused problems in performance of projects (World Bank, 2004).

Work on providing construction services in West Bank and Gaza (WB&G) has made considerable progress since the Palestinian Authority assumed responsibility for them, but the Palestinian have had to build from a low base, including a huge backlog of rehabilitation and development work, few institutions, and very little funding. So, they have had to work in every difficult physical, social, political, economic and institutional circumstance. For a number of reasons, the performance of construction projects has not been as impressive, fundamentally because of the PA's failure to establish a coherent institutional and policy framework. (World Bank, 2004).

Performance is related to many topics and factors such as time, cost, quality, client satisfaction; productivity and safety. Construction industry in the Gaza Strip suffers from many problems and complex issues in performance. For example, construction of 14 dwelling units at Rafah Area suffered from poor performance because of delay for about 110 days. There are many realistic reasons such as closures, amendment of drawings and amendment of the design. In addition, there are other different reasons affecting construction projects performance in the Gaza strip such as poor management and leadership; inappropriate participants; poor relations and coordination; absence of motivation, control, monitor or decision making systems; inadequate infrastructure, political problems; cultural problems and economic conditions (UNRWA, 2000).

While individual organizations have been measuring their performance for many years, there has been little consistency in the data, and the way it has been published. The performance can be measured by key indicators for evaluation. The purpose of Key performance indicators (KPIs) is that clients want their projects delivered: on time, on budget, free from defects, efficiently, right first time, safely, by profitable companies. So, Regular clients expect continuous improvement from their construction team to achieve year-on-year: reductions in project costs and time. In addition, the Key Performance Indicators (KPIs) can be used for benchmarking purposes, and will be a key component of any organization move towards achieving best practice. Clients, for instance, assess the suitability of potential suppliers or contractors for a project, by asking them to provide information about how they response to a range of indicators. Some information will also be available through the industry's benchmarking initiatives, so clients observe how potential suppliers compare with the rest of industry in a number of different areas. Construction supply chain companies will be able to benchmark their performance to enable them to identify strengths and weaknesses, and assess their ability to improve over time. The KPIs framework consists of seven main groups: time, cost, quality, client satisfaction, client changes, business Performance, health and safety (DETR, 2000)

In Gaza strip, there are many construction projects fail in performance. In addition, performance measurement systems are not effective or efficient to overcome this

problem. Construction projects performance problem appears in many aspects in the Gaza strip. There are many constructed projects fail in time performance, others fail in cost performance and others fail in other performance indicators. In 2006 there were many projects which finished with poor performance because of many evidential reasons such as: obstacles by client, non-availability of materials, road closure, amendment of the design and drawing, additional works, waiting the decision, handing over, variation order, amendments in Bill of Quantity (B.O.Q) and delay of receiving drawings (UNRWA, 2006). There are other indicators for problems of performance in Gaza strip such as project management, coordination between participants, monitoring, feedback and leadership skills. In addition, political, economic and cultural issues are three important indicators related to failures of projects' performance in the Gaza strip. (UNRWA, 2006&2007).

In this study, factors affecting the performance of construction projects in the Gaza strip will be analyzed. Performance indicators are used to measure performance in construction projects. These indicators can then be used for benchmarking purposes, and will be a key component of any organization's move towards achieving best practice in order to overcome performance problem. However, this study aims at identify the factors and attributes affecting the performance of construction projects in the Gaza strip and to obtain main criteria and indicators to measure performance.

1.2 Research Objectives

The aim of this research is to analyze the local factors affecting the performance of construction projects in the Gaza Strip. The aim of this research can be broken down into the following objectives:

1. To identify the factors affecting the performance of construction projects (Key performance indicators)
2. To determine owners, consultants and contractors perceptions towards the relative importance of the key performance indicators in Gaza Strip construction projects in order to evaluate performance of construction projects in the Gaza Strip

3. To identify the most significant key performance indicators of construction projects in the Gaza strip
4. To evaluate the degree of agreement/disagreement between owners, contractors and consultants regarding the ranking of key performance indicators
5. To test the hypothesis to verify the association between the ranking of owners, contractors and consultants parties regarding key performance indicators
6. To formulate recommendations to improve performance of construction projects in the Gaza Strip

1.3 Statement of the Problem

It is shown from previous studies (Karim and Marosszeky, 1999; DETR (KPI Report), 2000; Lehtonen, 2001; Samson and Lema, 2002; Kuprenas, 2003; Cheung, 2004; Iyer and Jha, 2005; Navon, 2005; Ugwa and Haupt, 2007) that the failure of any project is mainly related to the problems and failure in performance. Moreover, there are many reasons and factors which attribute to such this problem. In Gaza strip, there are many construction projects fail in performance. In addition, performance measurement systems are not effective or efficient to overcome such this problem.

In Gaza strip, construction projects performance problem appears through different directions. There are many constructed projects fail in time performance, others fail in cost performance and others fail in other performance indicators. In 2006 there were many projects which finished with poor performance because of many evidential reasons such as: obstacles by client, non-availability of materials, roads closure, amendment of the design and drawing, additional works, waiting the decision, handing over, variation order, amendments in Bill of Quantity and delay of receiving drawings (UNRWA, 2006&2007). For example, project of Repair of 58 Shelters at Khanyounis area finished with problems in both of time and cost performance (UNRWA, 2007). In addition there are other indicators of performance in the Gaza strip such as project managers, coordination between participants, monitoring, feedback and leadership skills. However, there are three important issues related to failures and problems of performance in the Gaza strip which are political, economic and cultural issues.

Therefore, this research will evaluate the factors affecting the performance of construction projects in the Gaza Strip in order to assist owners, consultants and contractors to overcome performance problem and to improve performance of their construction projects. Hence, performance of any construction projects can be evaluated according to key performance indicators.

1.4 Justification

Construction industry has complexity in its nature because it contains large number of parties as clients, contractors, consultants, stakeholders, shareholders, regulators and others. Construction projects in the Gaza Strip suffer from many problems and complex issues in performance because of many reasons and factors. This thesis is very important to identify and to evaluate the main factors affecting the performance of construction projects in the Gaza strip. The practices concerning with the KPIs such as time, cost, project owner satisfaction and safety checklists will be analyzed in order to know the main practical problems of projects performance in the Gaza Strip and then to formulate recommendations to improve performance of construction projects in the Gaza Strip.

Because of performance problem in the Gaza Strip as shown previously and because previous studies in the Gaza Strip about this topic do not deal wish all aspects of construction project performance; this study is required and very important to be considered. In this study, it will be studied the factors affecting the performance of construction projects in the Gaza Strip. These factors can be said as key performance indicators (KPIs). These KPIs can be used to measure performance in construction projects and can then be used for benchmarking purposes. This will be a key component of any organization move towards achieving best practice in order to overcome performance problem in the Gaza strip.

1.5 Thesis Structure

This research consists of five main chapters as followings:

- Chapter one: Introduction: this chapter shows the main objectives of research, statement of the problem and justification of research
- Chapter two: Literature review: this chapter shows a historical review from previous studied to identify the main factors affecting the performance of construction projects
- Chapter three: Methodology: this chapter shows the main methodologies used in previous studies and the methodology used in this research in order to achieve the required objectives
- Chapter four: Results analysis: this chapter shows analysis, description and discussion of research results
- Chapter five: Conclusions and recommendations
- Appendix

CHAPTER 2

LITERATURE REVIEW

2.1 Definitions and Concepts

Okuwoga (1998) stated that the performance of the construction industry is considered as a source of concern to both public and private sector clients. Karim and Marosszeky (1999) studied performance measurement using Key performance indicators (KPIs). KPIs enable a comparison between different projects and enterprises to identify the existence of particular patterns. The specialist contractors hoped that the data trends observed will provide insight into certain inefficiencies that are prevalent in the market. They intend to use the data expose these inefficiencies and as a basis for industry development (Karim and Marosszeky, 1999).

Key performance indicators (KPIs) include factors such as time, cost, quality, client satisfaction; client changes, business performance and safety in order to enable measurement of project and organizational performance throughout the construction industry. This information can then be used for benchmarking purposes, and will be a key component of any organization move towards achieving best practice (DETR, 2000). Lehtonen (2001) stated that performance measurement is a current issue in academia, as well as in business community. Samson and Lema (2002) stated that KPIs are very important in order to deliver value to stakeholders. So, companies must be sure they have right processes and capabilities in place. The KPIs also allow to trace which processes and capabilities must be competitively and distinctive, and which merely need to be improved or maintained.

In order to define the KPIs throughout the lifetime of a project, five key stages have been identified as shown in Figure 2.1 (DETR, 2000):

A. Commit to Invest: the point at which the client decides in principle to invest in a project, sets out the requirements in business terms and authorizes the project team to proceed with the conceptual design.

B. Commit to Construct: the point at which the client authorizes the project team to start the construction of the project.

C. Available for Use: the point at which the project is available for substantial occupancy or use. This may be in advance of the completion of the project.

D. End of Defect Liability Period: the point at which the period within the construction contract during which the contractor is obliged to rectify defects ends (often 12 months from point C).

E. End of Lifetime of Project: the point at which the period over which the project is employed in its original or near original purpose ends. As this is usually many years after the project's completion, this is a theoretical point over which concepts such as full life costs can be applied.

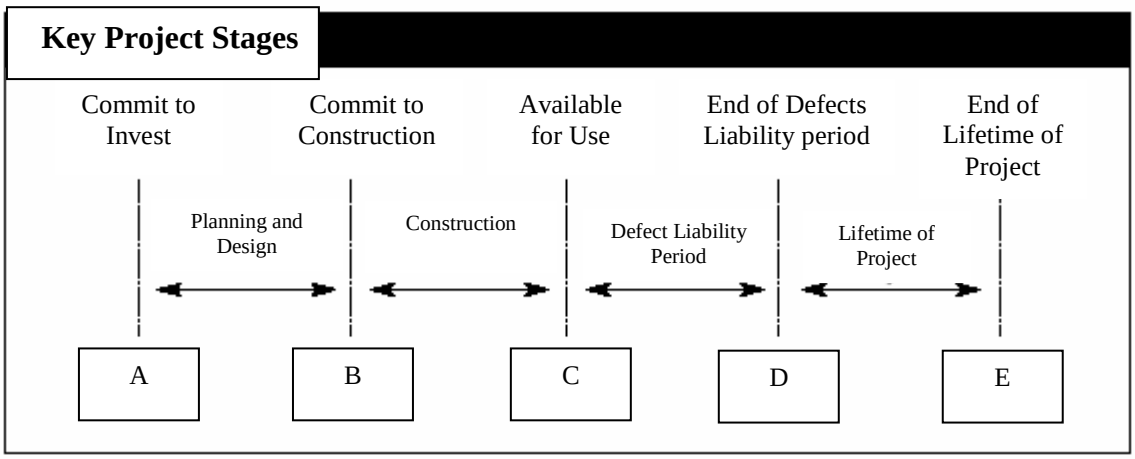

Fig. 2.1. KPIs throughout the lifetime of a project (Source: DETR, 2000)

Performance measurement and its indicators had been studied for several years. Karim and Marosszeky (1999) defined performance measurement as an operational management accounting including financial and non-financial performance indicators. Karim and Marosszeky (1999) stated that performance measurement is a process of re-thinking and re-evaluation of business processes to achieve significant performance improvements of projects. Reichelt and Lyneis (1999) defined performance measurement as a model which treat project as the complex dynamic system.

The key performance indicators are identified by DETR (2000) as an applicable indication of project and/or company levels. In some cases the company indicator is the average value of that company's project indicators. Al-Momani (2000) stated that the owner satisfaction for performance can be defined as the gap between what the owner expects and the level of performance they believe is being delivered by the contractors. Lehtonen (2001) stated that performance measurement is a basis for progressive improvement and monitoring of company productivity. Chan and Kumaraswamy (2002) remarked that project performance measurement include time, budget, safety, quality and overall client satisfaction. Thomas (2002) defined performance measurement as monitoring and controlling of projects according to regular basis. Kuprenas (2003) stated that project performance measurement means an improvement of cost, schedule, and quality for design and construction stages. Long et al (2004) stated that a project performance measurement is related to many indicators such as time, budget, quality, specifications and stakeholders' satisfaction. Navon (2005) defined performance measurement as a comparison between the desired and the actual performances. Ugwu and Haupt (2007) classified the key performance indicators as site-specific and project-specific. Early Contractor Involvement (ECI) and Early Supplier Involvement (ESI) give contractors and suppliers the opportunity to give advice and/or specific ideas earlier to enhance performance.

According to previous studies, concepts and definitions, it can be said that the performance measurement is a process include factors as Key Performance Indicators (KPIs) such as time, cost, quality, client satisfaction; productivity and safety in order to enable measurement of current organizational project performance and to achieve significant performance improvements of future projects.

2.2 Problem of Performance in Construction Industry

The failure of any construction project is mainly related to the problems and failure in performance. Moreover, there are many reasons and factors which attribute to such problem. Ogunlana et al, (1996) stated that the construction industry performance problems in developing economies can be classified in three layers: problems of shortages or inadequacies in industry infrastructure (mainly supply of resources),

problems caused by clients and consultants and problems caused by contractor incompetence/inadequacies. Okuwoga (1998) identified that the performance problem is related to poor budgetary and time control. Long et al (2004) remarked that performance problems arise in large construction projects due to many reasons such as: incompetent designers/contractors, poor estimation and change management, social and technological issues, site related issues and improper techniques and tools. Navon (2005) stated that the main performance problem can be divided into two groups: (a) unrealistic target setting (i.e., planning) or (b) causes originating from the actual construction (in many cases the causes for deviation originate from both sources).

Samson and Lema (2002) found that the traditional performance measurement systems have problems because of large and complex amount of information with absence of approaches to assist decision maker understand, organize and use such information to manage organizational performance. Navon (2005) remarked that traditional project performance control is usually generic (e.g., cost control techniques). It relies on manual data collection, which means that it is done at low frequency (normally once a month) and quite some time after the controlled event occurred (i.e., not in real-time). Moreover, manual data collection normally gives low-quality data.

Ling et al (2007) remarked that architectural, engineering and construction (AEC) firms may face difficulties managing construction projects performance in China because they are unfamiliar with this new operating environment. Kim et al (2008) stated that international construction projects performance is affected by more complex and dynamic factors than domestic projects; frequently being exposed to serious external uncertainties such as political, economical, social, and cultural risks, as well as internal risks from within the project.

2.3 Construction Management and Performance

There is a strong relation between project management and project performance. Management in construction industry is considered as one of the most important

factors affecting performance of works. Brown and Adams (2000) studied a new approach to the measurement of the effect of Building Project Management (BPM) on time, cost and quality outputs using 15 `cases' derived from UK data. The evaluation undertaken demonstrates that BPM as it is presently implemented in the UK fails to perform as expected in relation to the three predominant performance evaluation criteria; time, cost and quality. Lehtonen (2001) obtained a model for performance measurement which assist both firms' top management and operational managers for continuous feedback on operational activities. Thomas (2002) stated that documenting and archiving performance data could be useful for future reference, such as for settling disputes on claims, and in maintenance and repair works. Kuprenas (2003) remarked that quantification of the impacts of the project management processes are identified through three steps of analysis: comparison of summary statistics of design performance, proof of statistical significance of any differences and calculation of a least squares regression line of a plot of design performance measurement versus amount/application of project management as a means to quantify management influence to design phase cost performance.

Cheung et al (2004) studied the project performance related to project managers. It is remarked that development of a Web-based construction Project Performance Monitoring System (PPMS) can assist project managers in exercising construction project performance indicators and can help senior project management, project directors, project managers, etc., in monitoring and assessing project performance. Pheng and Chuan (2006) stated that while project management is only one of the many criteria upon which project performance is contingent, it is also arguably the most significant as people formulating the processes and systems who deliver the projects. Ugwu and Haupt (2007) stated that an adequate understanding and knowledge of performance are desirable for archiving managerial goals such as improvement of institutional transformations, and efficient decision making in design, specification and construction, at various project-level interfaces, using appropriate decision-support tools. Ling et al (2007) investigated project management (PM) practices adopted by Singaporean construction firms. It was determined the performance level of their projects in China; identifies PM practices that led to better performance; and recommended key PM practices that could be adopted by foreign construction firms in China to improve project performance.

2.4 Construction Projects and Performance

Success of construction projects depends mainly on success of performance. Many previous researches had been studied performance of construction projects. Dissanayaka and Kumaraswamy (1999) remarked that one of the principle reasons for the construction industry's poor performance has been attributed to the inappropriateness of the chosen procurement system. Reichelt and Lyneis (1999) remarked three important structures underlying the dynamic of a project performance which are: the work accomplishment structure, feedback effects on productivity and work quality and effects from upstream phases to downstream phases. Thomas (2002) identified the main performance criteria of construction projects as financial stability, progress of work, standard of quality, health and safety, resources, relationship with clients, relationship with consultants, management capabilities, claim and contractual disputes, relationship with subcontractors, reputation and amount of subcontracting. Chan and Kumaraswamy (2002) stated that construction time is increasingly important because it often serves as a crucial benchmarking for assessing the performance of a project and the efficiency of the project organization.

Cheung et al (2004) identified project performance categories such as people, cost, time, quality, safety and health, environment, client satisfaction, and communication. It is obtained by Navon (2005) that a control system is an important element to identify factors affecting construction project effort. For each of the project goals, one or more Project Performance Indicators (PPI) is needed. Pheng and Chuan (2006) obtained that human factors played an important role in determining the performance of a project. Ugwu and Haupt (2007) remarked that both early contractor involvement (ECI) and early supplier involvement (ESI) would minimize constructability-related performance problems including costs associated with delays, claims, wastages and rework, etc. Ling et al (2007) obtained that the most important of practices relating to scope management are controlling the quality of the contract document, quality of response to perceived variations and extent of changes to the contract. It was recommended for foreign firms to adopt some of the project management practices highlighted to help them to achieve better project performance in China.

2.5 Information Technology and Construction Projects Performance

Information technology technique is very important in the entire world. Information technology (IT) opens new visions in the businesses and industries performance of the world. The construction industry is considered as one of the industries using IT technique such as software management systems, database and communications. For many years, many processes, functions, operations were done difficulty because of absence of IT field. In addition, most of the work was done manually which lead to more cost, time and poor performance. Further more, IT usage in the construction industry leads to many changes, innovations and developing in many aspects which lead finally to good and strong performance. There are many benefits and relations of using IT in the construction projects such as: greater use of IT correlates with better project performance, owners and contractors realize meaningful benefits, IT affects schedule compression beneficially, and overall project cost savings which lead to a success performance of project (Schwegler et al, 2001).

Nitithamyong et al (2004) remarked that information Technology (IT) is now routinely used in the construction industry as a tool to reduce some of the problems generated by fragmentation. The use of IT improves coordination and collaboration between firms participating in a construction project, leading to better communication practices and so good performance. Its benefits include an increase in the quality of documents and the speed of the work, better financial control and communications, and simpler and faster access to common data as well as a decrease in documentation errors.

Thomas (2002) proposed contractor Performance Appraisal and Reporting (PAR) system for reviewing contractor performance at an organizational level. Advancements in World Wide Web techniques provide enhanced capacities to collect compile and disseminate performance-related information to various construction stakeholders in a timely and cost-effective manner. Becerik (2004) stated that the rapid advances of web-based project management and collaboration technology offer new opportunities to improve existing construction project performance. Cheung et al (2004) obtained framework software to measure project performance based on project performance measurement system (PPMS). The system contains four stages which are

data entry, database, reporting and action. This system has eight categories to measure performance which are people, cost, time, quality, safety and health, environment, client satisfaction, and communication. Goh (2005) remarked that information technology management leads to performance improvement in the construction industries. For instance, in Singapore 2003, general administration, design, project management, site management were enhanced by using of IT. In addition, there were more advantages as quick working, good quality of work and fast access of information.

2.6 Factors Affecting Performance of Managers

Ogunlana et al, (1996) recommended the need for focused effort by economy managers and construction industry associations to provide the infrastructure needed for efficient project management and performance. Dissanayaka and Kumaraswamy (1999) stated that the knowledge that would influence potential performance enables project managers to pay special attention to control performance more effectively. Chan and Kumaraswamy (2002) remarked that effective communication and fast information transfer between managers and participants help to accelerate the building construction process and performance. Kuprenas (2003) studied the impact of the use of a project management based organizational structure, project manager training, frequency of design meetings, and frequency of design reports on design phase cost performance. The process of a design team meeting frequency and the process of written reporting of design phase progress were found to be statistically significant in reducing design phase costs.

Navon (2005) stated that data are collected and used for construction managers as a basis to evaluate the project performance indicator's (PPI) actual value to compare it with the planned value and forecast its future value based on past performance. Pheng and Chuan (2006) identified the importance of the working environment variables for the performance of a project manager in the private and public sectors according to three main groups which are job condition, project characteristic and organizational related categories. The result revealed that working hours, physical condition of project site, complexity of project, material and supplies, project size, duration of

project and time availability were viewed differently in terms of importance by the contractors and consultants groups. Team relationship was ranked as the most important variable affecting the performance of a project manager. It is obtained that project managers experiences do not have much effect on how they perceive their working environment.

2.7 Factors Affecting Cost and Time Performance

Chan and Kumaraswamy (2002) remarked that studies in various countries appear to have contributed significantly to the body of knowledge relating to time performance in construction projects over the past three decades, while Iyer and Jha (2005) remarked that project performance in term of cost is studied since 1960s. These studies range from theoretical work based on experience of researcher on one end to structured research work on the other end. Moreover, Pheng and Chuan (2006) stated that there have been many past studies on project performance according to cost and time factors.

Chan and Kumaraswamy (1996) stated that a number of unexpected problems and changes from original design arise during the construction phase, leading to problems in cost and time performance. It is found that poor site management, unforeseen ground conditions and low speed of decision making involving all project teams are the three most significant factors causing delays and problems of time performance in local building works. Okuwoga (1998) stated that cost and time performance has been identified as general problems in the construction industry worldwide. Dissanayaka and Kumaraswamy (1999) remarked that project complexity, client type, experience of team and communication are highly correlated with the time performance; whilst project complexity, client characteristics and contractor characteristics are highly correlated with the cost performance. Reichelt and Lyneis (1999) obtained that project schedule and budget performance are controlled by the dynamic feedback process. Those processes include the rework cycle, feedback loops creating changes in productivity and quality, and effects between work phases.

Chan (2001) identified that the best predictor of average construction time performance of public sector projects in Malaysia is $T = 269\ C^{0.32}$. This relationship

can serve as a convenient tool for both project managers and clients to predict the average time required for delivery of a construction project. Kuprenas (2003) stated that process of a design team meeting frequency and the process of written reporting of design phase progress were found to be statistically significant in reducing design phase costs. Otherwise, the use of project manager training and a project management based organizational structure were found to be processes that do not create a statistically significant in reducing design phase costs.

Iyer and Jha (2005) remarked that the factors affecting cost performance are: project manager's competence; top management support; project manager's coordinating and leadership skill; monitoring and feedback by the participants; decision making; coordination among project participants; owners' competence; social condition, economical condition and climatic condition. Coordination among project participants was as the most significant of all the factors having maximum influence on cost performance of projects. Love et al (2005) examined project time-cost performance relationships by using project scope factors for 161 construction projects that were completed in various Australian States. It is noticed that gross floor area and the number of floors in a building are key determinants of time performance in projects. Furthermore, the results indicate that cost is a poor predictor of time performance.

Chan and Kumaraswamy (2002) proposed specific technological and managerial strategies to increase speed of construction and so to upgrade the construction time performance. It is remarked that effective communication, fast information transfer between project participants, the better selection and training of managers, and detailed construction programs with advanced available software can help to accelerate the performance. Jouini et al (2004) stated that managing speed in engineering, procurement and construction projects is a key factor in the competition between innovative firms. It is found that customers can consider time as a resource and, in that case, they will encourage the contractor to improve the time performance.

2.8 Measurement of Project Performance

Karim and Marosszeky (1999) stated that performance measurement systems have been one of the primary tools used by the manufacturing sector for business process re-engineering in order to monitor the outcomes and effectiveness of implementation. Brown and Adams (2000) obtained an evaluation framework to measure the efficiency of building project management (BPM) by using conventional economic analysis tools such as time, cost and quality. Lehtonen (2001) stated that performance measurement systems are imminent in the construction firms. Samson and Lema (2002) stated that effective and efficient management of contractors' organizational performance requires commitment to effective performance measurement in order to evaluate, control, and improve performance today and in the future.

Tangen (2004) obtained that performance measurement is a complex issue that normally incorporates at least three different disciplines: economics, management and accounting. Measurement of performance has garnered significant interest recently among both academics and practitioners. Tangen (2004) remarked the choice of a suitable measurement technique depends on a number of factors, including the purpose of the measurement; the level of detail required; the time available for the measurement; the existence of available predetermined data; and the cost of measurement.

Navon (2005) defined performance measurement as a comparison between the desired and the actual performances. For example, when a deviation is detected, the construction management analyzes the reasons for it. The reasons for deviation can be schematically divided into two groups: (a) unrealistic target setting (i.e., planning) or (b) causes originating from the actual construction (in many cases the causes for deviation originate from both sources). Navon (2005) stated that performance measurement is needed not only to control current projects but also to update the historic database. Such updates enable better planning of future projects in terms of costs, schedules, labor allocation, etc. Pheng and Chuan (2006) stated that the measurement of project performance can no longer be restricted to the traditional criteria, which consist of time, cost and quality. There are other measurement criteria such as project management and products.

Cheung et al (2004) stated that New South Wales Public Works Department in Australia launched a Project Performance Evaluation (PPE) framework, which covers a wide range of performance parameters. PPE parameters are communication, time, cost, quality, safety, claims and issues resolution, environment, contract relations. The main purpose of PPE is to extend project performance measures to cover soft parameters also, such as communication and dispute resolution. In the UK, a project performance measurement tool referred to as the Key Performance Indicators (KPIs) was developed by the KPI working group under the UK Construction Industry Best Practice Programme to include time, cost, quality, client satisfaction, change orders, business performance, health and safety. The three major steps in implementing KPIs are as follows: Decide what to measure, Collect data and Calculate the KPIs. However, both the PPE and KPIs are valuable tools for measuring project performance over a period of time. Anyway, it is obtained from previous study that both methods PPE and KPIs can be used for measuring of performance as the indicators are similar in two methods. In this study KPIs method will be used to measure performance.

Iyer and Jha (2005) stated that measuring the performance of any construction project is a very complex process because modern construction projects are generally multidisciplinary in nature and they involve participation of designers, contractors, subcontractors, specialists, construction managers, and consultants. With the increasing size of the project, number of participants in the project also increases. The objectives or goals of all participants need not be same even in a given project. Hence to measure performance of a project without specifying the participant and without specifying the criteria for judging the performance holds no meaning. Past researchers have employed different criteria such as compliance to schedule, cost and quality to judge the project performance.

Lehtonen (2001) proposed new framework for measuring construction logistics by using two-dimensions in order to improve productivity. The first dimension (use of measures) contains two kinds of measures. One of these kinds is called improvement measures which help construction industry to find out the problems with current practices. These measures are mainly used during development projects. Another kind

is called monitoring measures which are used for continuous monitoring of operations. The second dimension of the framework is the focus of measures. It clarifies at which organizational level measures can be used. There should be information available at the company and project level, as well as at the specific supplier or subcontractor level.

Samson and Lema (2002) proposed performance measurement system. The system comprises of construction business perspective including innovation and learning, processes, project, stakeholders, and financial perspective. The indicators developed from perspectives are categorized into three main groups which are drivers' indicators, process indicators and results indicators. The key to the success or failure of the measurement system are leadership commitment; employees' involvement and empowerment; and information coordination and management. Shen et al (2005) presented a method for measuring the environmental performance of construction activities committed by a contractor through calculating the contractor's environmental performance score (EPS). The level of EPS serves as a simple indicator for measuring and communicating the level of a contractor's environmental performance.

Cost performance can be measured through a cost performance index (CPI) computed as (Kuprenas, 2003):

$$CPI=BCWP/ACWP$$

Where:

- BCWP = budgeted cost of the work performed
- ACWP = actual cost of the work performed.

From previous equation:

- If CPI value of one means, the cost was as planned (at the budget Value)
- If CPI value above one means, the project was below its budget
- If CPI of less than one means, the project exceeded its budget.

Based on previous equation, time performance is measured through a schedule performance index (SPI) computed as:

SPI=BCWP/BCWS

Where:

- BCWP = budgeted cost of the work performed
- BCWS = budgeted cost of the work scheduled.

From previous equation:

- If SPI value of one means, the time was as planned (at the time Value)
- If SPI value above one means, the project was ahead of schedule
- If SPI of less than one means, the project was behind schedule

2.9 Key Performance Indicators

Karim and Marosszeky (1999) defined the purpose of KPI's as to enable a comparison between different projects and enterprises to identify the existence of particular patterns. Dissanayaka and Kumaraswamy (1999) used different representation values to evaluate time and cost performance such as project characteristics, procurement system, project team performance, client representation's characteristics, contractor characteristics, design team characteristics, external condition. Karim and Marosszeky (1999) stated that the development and use of key performance indicators (KPI's) can help to identify dysfunctional in the procurement process. Karim and Marosszeky (1999) studied the development of key performance indicators to measure performance such as cost of pricing the tender as a percentage of contract value, cost of pricing the tender as a percentage of contract value, no. of times base tender price changed, time from the first tender to actual award of contract, average delay in payment of base claim, average delay in payment of agreed variations, average time for approval of agreed variations.

Samson and Lema (2002) remarked that characteristics of emerging performance measurement indicators need analysis of both the organization and environment such as: nature of work, global competition, quality awards, organizational role, external demands and power of IT. The indicators should be able to identify causes of problems, address all possible performance drivers, and identify potential opportunities for improvement. Stewart and Mohamed (2003) emphasized the

importance of a structured evaluation framework to evaluate the value IT adds to the process of project information management. The framework is in the form of a 'Construct IT' with IT performance perspectives and indicators developed specifically for managing information on construction projects. Therefore, construction organizations should lay the foundations for an IT performance measurement and management culture, by actively seeking to quantify the value IT generates.

Cheung et al (2004) remarked seven main key indicators for performance which are: time, cost, quality, client satisfaction, client changes, business performance, and safety and health. Navon (2005) stated that a number of research efforts to fully automate project performance control of various project performance indicators have been carried out in recent years. These are also briefly described together with the concept of measuring indirect parameters and converting them into the sought indicators. These are (1) labor and earthmoving productivity based on measuring the location of workers or earthmoving equipment at regular time intervals; (2) progress based on the above data; (3) a comprehensive control of construction materials starting by monitoring orders and purchasing up to the movement of the materials on site.

Pheng and Chuan (2006) stated that project performance can be determined by two common sets of indicators. The first set is related to the owner, users, stakeholders and the general public which are the groups of people who will look at project performance from the macro viewpoint. The second are the developer, a non-operator, and the contractor which are the groups of people who will look at project performance from the micro viewpoint. Jin et al (2006) studied the relationship-based factors that affect performance of general building projects in China. Thirteen performance metrics was used to measure the success level of construction projects. These factors were categorized into four groups namely cost, schedule, quality and relationship performance. It was recommended that foreign firms that have entered or are going to enter the Chinese construction industry should learn how to build cooperative and harmonious relationships with Chinese partners and finally achieve satisfactory project performance by paying sufficient attention to the aforementioned factors.

Ugwu and Haupt (2007) developed and validated key performance indicators (KPI) for sustainability appraisal using South Africa as a case study. It is used four main levels in a questionnaire to identify the relative importance of KPI. The main indicators were: economy, environment, society, resource utilization, health and safety and project management and administration. Luu et al (2007) provided nine key performance indicators (KPIs) which can be applied to measure project management performance PMP and evaluate potential contractors as well as their capacity by requesting these indices.

Based on previous literature review and historical studies about performance of construction projects. Table 2.1 shows a summary of the main groups affecting the performance of construction projects (KPIs groups).

Table (2.1) Summary of the main groups affecting the performance of construction projects (KPIs groups) and their references

Key Performance Indicators	Okuwoga (1998)	Dissanayaka And Kumaraswamy (1999)	Reichelt and Lyneis (1999)	Karim and Marosszeky (1999)	Brown and Adams (2000)	DETR (2000)	Lehtonen (2001)	Chan (2001)	Samson and Lema (2002)	Kuprenas (2003)	Cheung (2004)	Navon (2005)	Iyer et al (2005)	Love et al (2005)	Ugwu and Haupt (2007)	Hovichit (2007)	Added Factors
Cost	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
Time	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Quality			✓			✓			✓	✓	✓	✓	✓		✓	✓	
Productivity		✓	✓						✓			✓	✓	✓	✓	✓	
Client satisfaction						✓			✓		✓		✓				
Regular and community satisfaction									✓				✓				✓
People									✓				✓			✓	✓
Safety and health			✓		✓	✓			✓		✓				✓		✓
Innovation and learning									✓				✓				
Environment											✓		✓		✓		

2.10 Benchmarking and Performance

Tolosi (2000) defined benchmarking as a process which continuously measures the products, services and operational practices of a given organization to compare the organization's performance and operational practices with a selected sample group. In addition to create a basis for comparison, benchmarking is a good development tool because it enforces a self-critical approach, indicating the points of operation the company must improve. Li et al (2001) stated that cooperative benchmarking should be used as a tool for achieving partnering excellence in construction projects. Benchmarking involves a comparative analysis between at least two parties in order to compare the current performance gap. Chan Albert and Chan Daniel (2004) defined benchmarking as the search for the best practices that will lead to superior performance of an organization.

Tolosi (2000) stated that benchmarking is coming into increasing use in telecoms by management, regulators and offers potential for many useful applications. However, benchmarking must be used with caution, and its design as a tool of analysis must be thoughtfully considered in order to achieve accurate and meaningful indicators. The specific aspects of production and the companies to be used for benchmarking comparison must be carefully selected. Tolosi (2000) remarked that the term benchmarking is originated from the machine construction industry and refers to grouping technical and financial indicators for comparison amongst companies or across operating units within a company. The output is produced through comparing the key performance indicators of companies operating in comparable environments. Benchmarking helps companies to define the best possible indicators for comparison and to obtain a picture of the company's entire operation. Therefore, benchmarking is a useful tool for evaluating a company.

Li et al (2001) presented an eight-stage process of a cooperative benchmarking approach which can be used to improve the performance of parties entering into partnering agreements. Chan Albert and Chan Daniel (2004) obtained that the accurate construction planning is a key determinant in ensuring the delivery of a project on schedule and within budget. It is remarked that there is an increasing global concern about benchmarking best practice measures of construction time performance

(CTP) for use by clients, consultants and contractors in the construction industry. Gunduz et al (2005) seeked to analyze and reduce productivity losses due to change orders by benchmarking change order impacts on productivity for electrical and mechanical projects. Grigoroudis et al (2006) mentioned that benchmarking approach can be used in order to determine the organizational strong and weak points, to evaluate its performance, to identification the competitive advantages and disadvantages and to know the improvement priorities for each performance indicator.

Augusto et al (2006) stated that the effective performance can not be achieved without challenges and obstacles. To meet these challenges and overcome these obstacles, an organization must have a clear understanding of its performance in relation to its competitors. To accomplish this task, an organization must have an organizational benchmarking system which is occupied with analytical models designed to measure multifaceted performance characteristics and parameters. Grigoroudis et al (2006) studied the assessment of user-perceived web quality and used application of a satisfaction benchmarking approach. The benchmarking analysis consists of the following parts: (1) the user satisfaction analysis which concerns the identification of customer preferences and includes the estimation of the relative importance, and (2) the satisfaction benchmarking analysis which is mainly focused on the performance evaluation of the competitive organizations against the satisfaction criteria. The results presented how business organizations may locate their position against competition, reduce their weak points and determine which characteristics will improve their global performance. This gives the ability to identify the most critical improvement actions and adopt the best practices of the industry.

Abdel-Razek et al (2007) discussed the improving of construction labor productivity in Egypt by applying benchmarking for labor productivity performance. Labor productivity data was used from masonry activities on eleven building projects in Egypt, several measures of benchmarks of construction labor productivity were demonstrated, calculated, and then used to evaluate the productivity and identify the best and worst performing projects. Monch (2007) presented benchmarking efforts for production control approaches applied to complex manufacturing systems. Requirements for benchmarking were derived from a modeling and from special software. Cavalieri et al (2007) provided a comprehensive view of benchmarking and

performance measurement service for the evaluation and comparison of scheduling techniques. Luu et al (2007) presented how benchmarking approach can be applied to evaluate and improve the construction project management. A conceptual research framework was generally developed to perform a benchmarking study of the project management performance (PMP) from the contractor's viewpoint. It was remarked that benchmarking approach can help construction firms to learn from the best practices of others and carry out continuous improvement.

2.11 Project Success and Project Performance

Al-Momani (2000) stated that the success of any project is related to two important features, which are service quality in construction delivered by contractors and the project owner's expectations. Managing the construction so that all the participants perceive equity of benefits can be crucial to project success. It is obtained that the complete lack of attention devoted to owner's satisfaction contributes to poor performance. Declining market shares, low efficiency and productivity, and the rapid construction cost escalation also lead to poor performance. Nitithamyong et al (2004) remarked that the success of construction projects depends up on technology, process, people, procurement, legal issues, and knowledge management which must be considered equally.

Pheng and Chuan (2006) defined project success as the completion of a project within acceptable time, cost and quality and achieving client's satisfaction. Project success can be achieved through the good performance of indicators of the project. So, success refers to project success and performance refers to performance of indicators such as project managers. Wang and Huang (2006) stated that Project success has been widely discussed in the project management (PM) literature. The focus of most studies of project success is on dimensions of project success (how to measure it) and factors influencing project success. Wang and Huang (2006) studied that how the engineers evaluate project success and to what extent key project stakeholders' performance correlates with project success. It is obtained that project owners play the most important role in determining project success, and project management organizations' performance as the single point of project responsibility

has significant correlations with project success criteria. Lam et al (2007) stated that the allocation of risk among the contracting parties in a construction contract is an important decision leading to the project success.

2.12 Previous Local Studies

Yehia (2004) studied time schedule preparation by predicting production rate using simulation. Al Ostaz (2004) studied a cost monitoring system for Gaza Strip contractors. Hassouna (2005) studied the improvement of safety performance in construction projects in the Gaza Strip. Al-Khaldi (2006) evaluated performance of Beit-Lahia wastewater treatment plant in the Northen Gaza Strip.

Enshassi et al (2006) studied causes of contractor's business failure in developing countries. Factors were grouped together to only five main groups which are:

- Managerial: managerial factors are mainly related to experience, decisions, procurement, control, productivity, communication and claims factors
- Financial: financial factors are mainly related to loans, cash flow, profit, expenditures, material wastages, equipment cost and usage, and variation order
- Business growth: Business growth factors are mainly related to managerial development, size of projects, type of work and number of projects
- Business environment: Business environment factors are mainly related to regulations, awarding, economy, owner involvement and accounting practices
- Political: Political factors are mainly related to delay, closure, lack of resource, high cost of materials, banks policy and dealing with suppliers

The results showed that political group is the most important influencing factor on contractor's business failure in Palestine. Otherwise, Business growth and Business environment had been ranked as the lowest influencing factors on failure.

Balousha (Un Published)) has studied success factors of local construction projects in the Gaza strip. He studied only three factors affecting success of projects which are related to cost, time and quality based on the following issues:

- Project characteristics: this factor is broken into three main factors which are: Contractual arrangement, project environment and internal project characteristics.
- Project management strategies: this factor is broken into three main factors which are: communication, control and planning.
- Project participants: this factor is broken into three main factors which are: consultants, client and contractors.

Najjar (2008) has studied delay and cost overruns of construction projects in the Gaza Strip.

2.13 Summary

According to previous studies, it can be said that the performance measurement is a process include factors as Key Performance Indicators (KPIs) such as time, cost, quality, client satisfaction; productivity and safety in order to enable measurement of current organizational project performance and to achieve significant performance improvements of future projects.

It was obtained that there were many fields and topics which are related to performance such as, construction management, information technology, factors affecting performance of managers, measurement of project performance, key performance indicator and benchmarking.

The key performance indicators are used to evaluate performance of construction projects. These indicators can then be used for benchmarking purposes, and will be as a key component of any organization to move towards achieving best practice and to overcome performance problem in Gaza strip. Based on previous studies and literature review, the most important indicators which will be studied in this research are: (Okuwoga, 1998; Dissanayaka and Kumaraswamy, 1999; Reichelt and Lynies, 1999; Karim and Marosszeky, 1999; Brown and Adams, 2000; DETR (KPI Report), 2000; Lehtonen, 2001; Chan, 2001; Samson and Lema, 2002; Kuprenas, 2003; Cheung, 2004; Iyer and Jha, 2005; Navon, 2005; Love et al, 2005; Ugwa and Haupt, 2007; Hovichit, 2007):

1. Cost
2. Time
3. Quality
4. Productivity
5. Client satisfaction
6. Regular and community satisfaction
7. People
8. Health and Safety
9. Innovation and learning
10. Environment

CHAPTER 3

METHODOLOGY

3.1 Introduction

This research presents the main factors affecting the performance of construction projects in the Gaza strip. From literature review and past studies, it was obtained that there were different directions and methodologies used in order to achieve the required target, goals and objectives. Some of previous studies focused on factors affecting the performance of construction projects. Other studies concentrated on one or two directions such as cost, time or quality performance. Other studies focused on measurement of construction projects performance. Some of studies deal with different aspects related to performance such as information technology (IT).

The differentiation of directions and goals of topic as shown previously, required different methodologies. The main methodologies obtained from literature review were: questionnaire survey, interviewing, case studies and modeling. The following topics show summary of the main studies related to performance and their methodologies. Finally, it is shown methodology which is used in this research. Figure 3.1 shows summary of methodology used in this research.

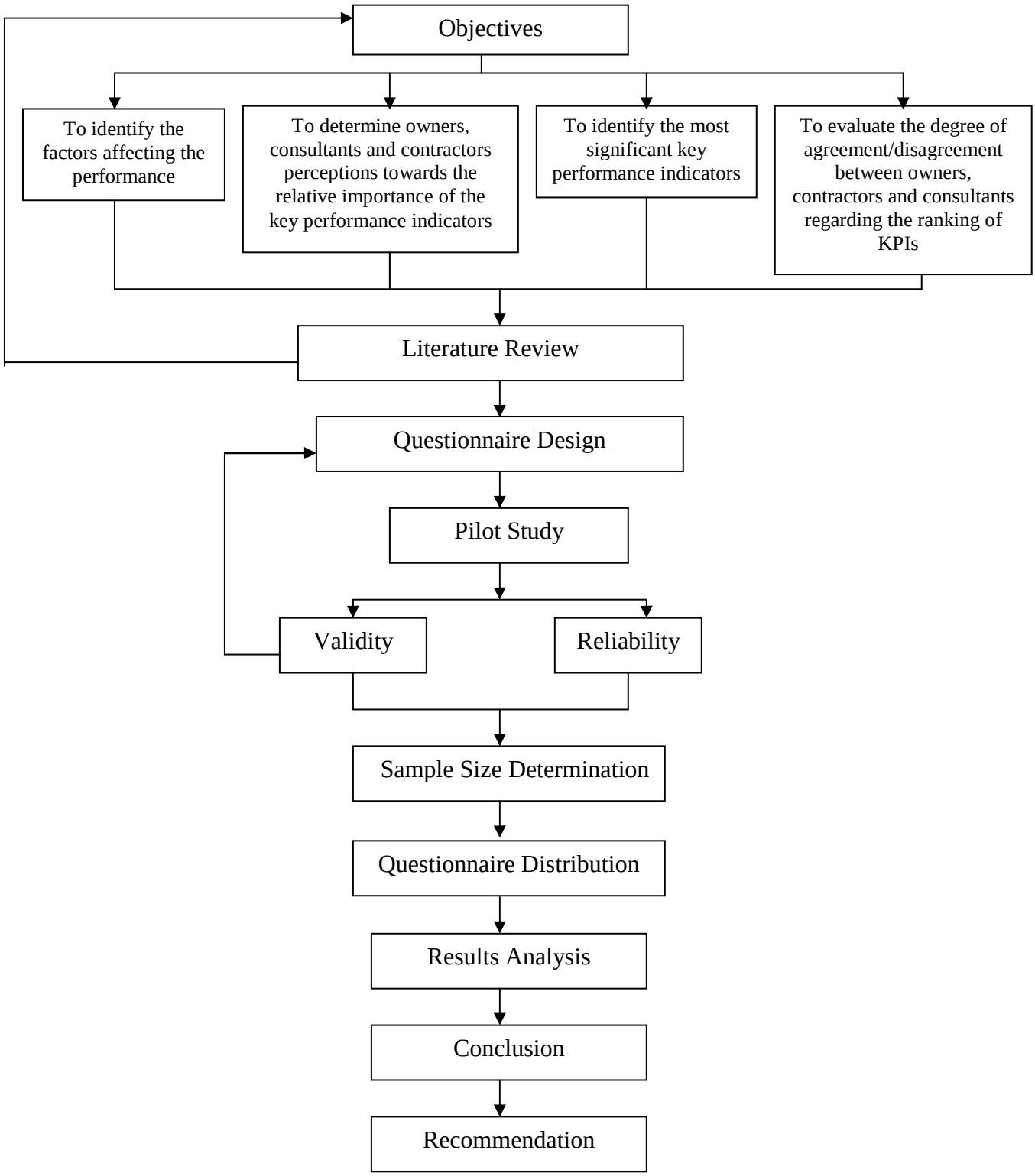

Fig. 3.1. Summary of methodology used in this research

3.2 Methodology Used in Previous Studies

Okuwoga (1998) studied 42 public sector housing projects in Nigeria as a case study in order to evaluate both time and cost performance. Reichelt and Lyneis (1999) used an empirical evidence as a case study from a sampling of large, complex development projects to evaluate the dynamic of project performance according to cost and schedule overrun. Karim and Marosszeky (1999) discussed the potential use of key performance indicators (KPI's), as well as results obtained during the trial application of these KPI's by a limited number of firms as a case study and during interviews with senior managers. Key performance indicators were developed for actual application within the construction industry projects.

Brown and Adams (2000) presented a new approach to the measurement of the effect of Building Project Management (BPM) on cost, time and quality performance outputs using 15 cases' derived from UK data and by developing a path model in order to achieve that. Chan (2001) studied the cost time relationships in public sectors in Malaysia. Time and cost data were collected from 51 public sector projects. Regression analysis was used to identify the relations between time and cost performance. Kuprenas (2003) studied over 270 completed municipal facilities, storm water, sewer, and street projects within the city of Los Angeles as a case study in order to assess the impact of the use of a project management based organizational structure, project manager training, frequency of design meetings, and frequency of design reports on design phase cost performance.

Iyer and Jha (2005) studied that the factors affecting cost performance by considering a questionnaire survey approach. Love et al (2005) examined project time-cost performance relationships by using project scope factors for 161 construction projects that were completed in various Australian States and using multiple regression technique of weighted lest squares. Ugwu and Haupt (2007) studied the key performance indicators and proposed an analytical decision model and a structured methodology for sustainability appraisal in infrastructure projects in a developing country like South Africa. The research was conducted using a combination of structured interviews with industry professionals, case study project data, existing government guidelines on environmental impact assessments and sustainable

construction environment, literature on sustainability research, and questionnaire-based survey for indicator validation. It is used the 'weighted sum model' technique in multi-criteria decision analysis (MCDA) and the 'additive utility model' in analytical hierarchical process (AHP) for multi- criteria decision.

Dissanayaka and Kumaraswamy (1999) developed a comprehensive model to incorporate all significant procurement sub-systems variables with non procurement variables based on time and cost performance. The multiple regression technique was applied to analyze the data from 32 Hong-Kong building projects and the results were compared with reality. Lehtonen (2001) proposed new framework for measuring construction logistics. Two-dimensional model are grouped by the use of measures and by the focus of measures. The first dimension (use of measures) contains two kinds of measures. One of them is called improvement measures and the other kind is called monitoring measures. The second dimension of the framework is the focus of measures. It clarifies at which organizational level measures can be used.

Samson and Lema (2002) proposed performance measurement system as a model based on literature review. The system comprises of construction business perspective including innovation and learning, processes, project, stakeholders, and financial perspective. It was proposed a questionnaire including set of indicators affecting project performance. Cheung et al (2004) obtained framework software to monitor and measure project performance based on project performance measurement system (PPMS). Project performance factors were identified as a questionnaire for inclusion in the PPMS. The monitoring process is automated through the use of the World Wide Web and database technology. Data collection and dissemination are similarly automated. The system contains four stages which are data entry, database, reporting and action. This system has eight indicators to measure performance which are people, cost, time, quality, safety and health, environment, client Satisfaction, and communication. Navon (2005) presented automated project performance control system (APPC) for measurement of the project performance indicators (PPI). The approach used for automated PPI measurement is that the values of some indirect parameters are measured automatically and converted into the sought value of the PPI by special algorithms.

3.3 Methodology for This Research

This research discusses the factors affecting performance within construction organizations in Gaza strip. The basic methodology which is considered to achieve the objectives of this research is as the following issues:

3.3.1 Concerning objective one: (To identify the factors affecting the performance of construction projects):

Literature review about performance was reviewed (Okuwoga, 1998; Dissanayaka and Kumaraswamy, 1999; Reichelt and Lynies, 1999; Karim and Marosszeky, 1999; Brown and Adams, 2000; DETR (KPI Report), 2000; Lehtonen, 2001; Chan, 2001; Samson and Lema, 2002; Kuprenas, 2003; Cheung, 2004; Iyer and Jha, 2005; Navon, 2005; Love et al, 2005; Ugwa and Haupt, 2007) to identify the factors affecting the performance of construction projects. In addition, there are other local factors that have been added as recommended by local experts such as escalation of material prices, differentiation of coin prices, average delay because of closures and material shortage, neighbors and site condition problems, belonging to work and location of project.

63 factors affecting performance of construction projects are selected. These factors are grouped into 10 groups based on literature review. These groups can give a comprehensive summary of the main key performance indicators. The factors, which are considered in the questionnaire, are summarized and collected according to previous studies and other factors are added as recommended by local experts as shown in Table 3.1.

3.3.2 Concerning objective two (To determine owners, consultants and contractors perceptions of the relative importance of the key performance indicators in Gaza Strip construction projects):

A structured questionnaire survey approach is considered to study the impact of various attributes and factors affecting performance. In addition, the questionnaire can assist to study the attitude of owners, consultants and contractors towards the factors that affect on performance in the construction industry.

The relative importance index method (RII) is used here to determine owners, consultants and contractors perceptions of the relative importance of the key performance indicators in Gaza Strip construction projects. The relative importance index is computed as (Cheung et al, 2004; Iyer and Jha, 2005; Ugwu and Haupt, 2007):

$$RII = \frac{\sum W}{A \times N}$$

Where:

- W is the weight given to each factor by the respondents and ranges from 1 to 5
- A = the highest weight = 5
- N = the total number of respondents

3.3.3 Concerning objective three (To identify the most significant key performance indicators of construction projects in the Gaza strip):

The relative importance index method (RII) is also used to determine the most significant key performance indicators of construction projects in the Gaza strip . The relative importance index is computed as shown previously (Cheung et al, 2004; Iyer and Jha, 2005; Ugwu and Haupt, 2007).

3.3.4 Concerning objective four (To evaluate the degree of agreement/disagreement between owners, contractors and consultants regarding the ranking of key performance indicators):

The degree of agreement between parties regarding the ranking of factors are determined according to Kendall's Coefficient of Concordance. The degree of agreement can be determined as the following equation (Moore et al, 2003; Frimpong et al, 2003):

$$W = \frac{12U - 3m^2 n(n-1)^2}{m^2 n(n-1)}$$

Where:

$$U = \sum_{i=1}^{n} \left(\sum R \right)^2$$

Moreover:

- n = number of factors;
- m = number of groups;
- j = the factors 1,2,…,n.

3.3.5 Concerning objective five (To test the hypothesis to verify the association between the ranking of owner, contractor and consultant parties regarding key performance indicators):

To test the hypothesis that there is no significant difference of opinion between the three parties regarding project performance factors, Kendall's Coefficient of Concordance is also used according to two hypothesizes. These hypothesizes are (Moore et al, 2003; Frimpong et al, 2003):

- Null Hypothesis: H0 : There is insignificant degree of agreement among the owners , contractors and consultants.

- Alternative Hypothesis: H1 : There is significant degree of agreement among the owners , contractors and consultants.

3.3.6 Concerning objective six (To formulate recommendations to improve performance of construction projects in the Gaza Strip):

The practices concerning with the KPIs such as time, cost, project owner satisfaction and the safety checklists are analyzed in order to know the main practical problems of projects performance in Gaza Strip and then to formulate recommendations to improve performance of construction projects in the Gaza Strip.

3.4 Pilot Study

3.4.1 Pilot study results

Pilot study of the questionnaire is achieved by a scouting sample, which consisted of 30 questionnaires. These questionnaires were distributed to expert engineers such as projects managers, site engineers/office engineers and organizations managers. They have a strong practical experience in construction industries field. Their sufficient experiences are a suitable indication for pilot study. The following items are summary of the main results obtained from pilot study:

1. Questionnaire should be started with a cover page
2. The first part of questionnaire should be general information about the organization.
3. Owner category should be added as a respondent of questionnaire
4. Typical of project organization should be modified according to actual and practical projects constructed in the Gaza strip such as building, roads and transportation, and water and sewage projects
5. Some factors and sentences should be modified or represented with more details
6. Some factors were repeated more than one time with the same meaning. So, it should be to eliminate these repeated factors
7. Some factors and sentences should be modified in order to give more clear meaning and understanding
8. Some local factors should be added as recommended by local experts which affect the performance of construction projects in the Gaza Strip
9. There are some parts of questionnaire required to be regulated well
10. Some factors should be rearranged in order to give more suitable and consistent meaning
11. There are some questions which are not practical or realistic with respect to situations of construction projects in the Gaza Strip. Such these questions should be removed or modified to realistic and practical situations of Gaza Strip
12. Some of factors related to consultant should be added
13. The practices concerning with owner satisfaction factors –part three of questionnaire- are required to be represented with more clear meaning
14. Some choices should be added in part three of questionnaire in order to achieve more accurate and suitable choice of respondents

3.4.2 Validity test

This section presents test of validity of questionnaire according to the pilot study. Validity refers to the degree to which an instrument measures what it is supposed to measure (Pilot and Hungler,1985). Validity has a number of different aspects and assessment approaches. Statistical validity is used to evaluate instrument validity, which include criterion-related validity and construct validity.

To insure the validity of the questionnaire, two statistical tests should be applied. The first test is Criterion-related validity test (Spearman test) which measure the correlation coefficient between each paragraph in one field and the whole field. The second test is structure validity test (Spearman test) that used to test the validity of the questionnaire structure by testing the validity of each field and the validity of the whole questionnaire. It measures the correlation coefficient between one filed and all the fields of the questionnaire that have the same level of similar scale.

3.4.2.1 Criterion-related validity test

To test criterion-related validity test, the correlation coefficient for each item of the group factors and the total of the field is achieved. The p-values (Sig.) are less than 0.01 for all results, so the correlation coefficients of each field are significant at $\alpha = 0.01$, so it can be said that the paragraphs of each field are consistent and valid to measure what it was set for. The results of criterion-related validity test can be obtained with more details and tables through appendix.

3.4.2.2 Structure validity test

It is assessed the fields structure validity by calculating the correlation coefficients of each field of the questionnaire and the whole of questionnaire.

Table (3.2) Correlation coefficient of each field and the whole of questionnaire

No.	Field	Spearman Correlation Coefficient	P-Value (Sig.)
1.	Cost factors	0.842	0.000**
2.	Time factors	0.805	0.000**

3.	Quality factors	0.713	0.000**
4.	Productivity factors	0.773	0.000**
5.	Client Satisfaction factors	0.684	0.000**
6.	Regular and community satisfaction factors	0.771	0.000**
7.	People factors	0.797	0.000**
8.	Health and Safety factors	0.784	0.000**
9.	Innovation and learning factors	0.727	0.000**
10.	Environment factors	0.609	0.000**

** Correlation is significant at the 0.01 level

Table 3.2 clarifies the correlation coefficient for each filed and the whole questionnaire. The p-values (Sig.) are less than 0.01, so the correlation coefficients of all the fields are significant at $\alpha = 0.01$, so it can be said that the fields are valid to measured what it was set for to achieve the main aim of the study .

3.4.3 Reliability statistics

This section presents test of reliability of questionnaire according to the pilot study. The reliability of an instrument is the degree of consistency which measures the attribute; it is supposed to be measuring (Polit & Hunger,1985). The less variation an instrument produces in repeated measurements of an attribute, the higher its reliability. Reliability can be equated with the stability, consistency, or dependability of a measuring tool. The test is repeated to the same sample of people on two occasions and then compares the scores obtained by computing a reliability coefficient (Polit & Hunger, 1985).

Chronbach's coefficient alpha (George and Mallery, 2003) is designed as a measure of internal consistency, that is, do all items within the instrument measure the same thing? Chronbach's alpha is used here to measure the reliability of the questionnaire between each field. The normal range of Chronbach's coefficient alpha value between 0.0 and + 1.0. The closer the Alpha is to 1, the greater the internal consistency of items in the instrument being assumed. The formula that determines alpha is fairly simple and makes use of the items (variables), k, in the scale and the average of the inter-item correlations, r:

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

As the number of items (variables) in the scale (k) increases the value α becomes large. Also, if the intercorrelation between items is large, the corresponding α will also be large.

Since the alpha value is inflated by a large number of variables then there is no set interpretation as to what is an acceptable alpha value. A rule of thumb that applies to must situations is:

$0.9 \leq \alpha \leq 1.0$	Excellent
$0.8 \leq \alpha < 0.9$	Good
$0.7 \leq \alpha < 0.8$	Acceptable
$0.6 \leq \alpha < 0.7$	Questionable
$0.5 \leq \alpha < 0.6$	Poor
$0.0 \leq \alpha < 0.5$	Unacceptable

The Chronbach's coefficient alpha was calculated for each field of the questionnaire. The most identical values of alpha indicate that the mean and variances in the original scales do not differ much, and thus standardization does not make a great difference in alpha.

Table 3.3 shows the values of Chronbach's Alpha for each filed of the questionnaire and the entire questionnaire. For the fields, values of Chronbach's Alpha were in the range from 0.707 and 0.879. This range is considered high; the result ensures the reliability of each field of the questionnaire. Chronbach's Alpha equals 0.962 for the entire questionnaire which indicates an excellent reliability of the entire questionnaire. Thereby, it can be said that it is proved that the questionnaire is valid, reliable, and ready for distribution for the population sample.

Table (3.3) Chronbach's Alpha for each filed of the questionnaire and all the questionnaire

No.	Field	Cronbach's Alpha
1.	Cost factors	0.869
2.	Time factors	0.834
3.	Quality factors	0.815

4.	Productivity factors	0.757
5.	Client Satisfaction factors	0.707
6.	Regular and community satisfaction factors	0.840
7.	People factors	0.879
8.	Health and Safety factors	0.829
9.	Innovation and learning factors	0.870
10.	Environment factors	0.849
	Total	**0.962**

3.5 Questionnaire Distribution

The target groups in this study are owners, contractors and consultants. According to the Palestinian Contractors Union in Gaza strip, there are 120 contractor organizations. According to the Engineers' Association in Gaza strip, there are 41 consultant offices. Number of owners is determined as 25 owners in Gaza strip. Kish (1965) showed that the sample size can be calculated as following equation for 94% confidence level (Assaf et al 2001, Israel 2003, Moore et al, 2003):

$$n= n'/ [1+(n'/N)]$$

Where:

- N = total number of population
- n= sample size from finite population
- n' = sample size from infinite population = S^2/V^2; where S^2 is the variance of the population elements and V is a standard error of sampling population. (Usually S = 0.5 and V = 0.06)

So, for 120 contractor organizations:

- $n= n'/ [1+(n'/N)]$
- $n'= S^2/V^2 = (0.5)^2/(0.06)^2 = 69.44$
- N = 120
- $n= 69.44/ [1+(69.44 / 120)] = 46$

This means that the questionnaire should be distributed to 46 contractor organizations in order to achieve 94% confidence level

So, for 41 consultant offices:

- n= n'/ [1+(n'/N)]
- n'= $S^2/V^2 = (0.5)^2/(0.06)^2 = 69.44$
- N = 41
- n= 69.44/ [1+(69.44 / 41)] = 25

This means that the questionnaire should be distributed to 25 consultant offices in order to achive 94% confidence level

For owners, the number is determined as not large as there are 25 owners. So it is not required to determine sample size using previous Kish equation and it can be selected all of 25 owners.

According to previous results of sample sizes, 120 questionnaires were distributed as follows: 25 to owners, 35 to consultants and 60 to contractors. 88 questionnaires were received (73%) as follows: 17 (70%) from owners, 25 (72%) from consultants and 46 (77%) from contractors as respondents. These percentages are shown in Figure 3.2.

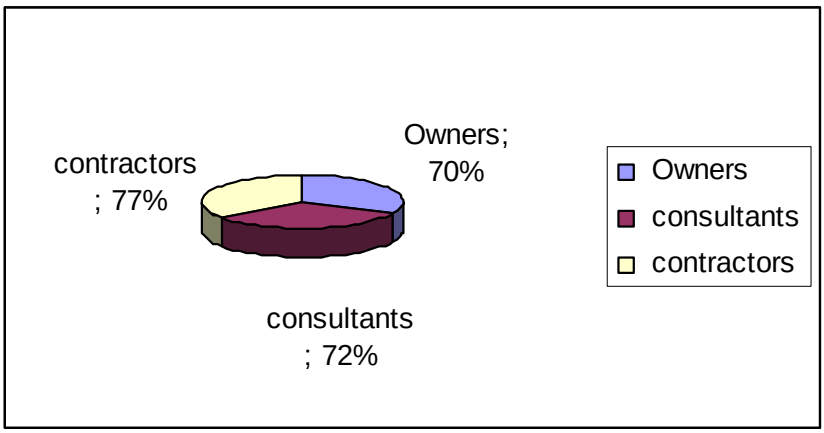

Fig. 3.2. Percentages of received questionnaires

These respondents are projects managers, site engineers and organizations managers, as they have a practical experience in construction industries field. Their sufficient experiences are a suitable indication to find out the perceptive of the relative importance of project performance indicators of the owner, consultant and contractor parties. Their experiences included many construction fields such as buildings, roads

and transportations, and water and sewage projects. The following Table 3.4 shows summary for frequency of job title of the respondents for each group.

Table (3.4) Frequency of Job title of the respondents

Job title of the respondent	Owner	Consultant	Contractor
	Frequency	Frequency	Frequency
Project Manager	3	5	13
Site Engineer	7	10	6
Organization Manager	2	7	23

3.6 Data Measurement

In order to be able to select the appropriate method of analysis, the level of measurement must be understood. For each type of measurement, there is/are an appropriate method/s that can be applied and not others. In this research, ordinal scales were used. Ordinal scale as shown in Table 3.5 is a ranking or a rating data that normally uses integers in ascending or descending order. The numbers assigned to the important (1,2,3,4,5) do not indicate that the interval between scales are equal, nor do they indicate absolute quantities. They are merely numerical labels. Based on Likert scale we have the following table 3.5 (Cheung et al, 2004; Iyer and Jha, 2005; Ugwu and Haupt, 2007):

Table (3.5) Ordinal scale used for data measurement

Item	***Very high important***	***High important***	***Medium important***	***Low important***	***Very low important***
Scale	5	4	3	2	1

The relative importance index method (RII) is used here to determine owners, consultants and contractors perceptions of the relative importance of the key performance indicators in Gaza Strip construction projects. The relative importance index is computed as (Cheung et al, 2004; Iyer and Jha, 2005; Ugwu and Haupt, 2007):

$$RII = \frac{\sum W}{A \times N}$$

Where:

- W is the weight given to each factor by the respondents and ranges from 1 to 5
- A = the highest weight = 5
- N = the total number of respondents

CHAPTER 4

RESULTS AND ANALYSIS

4.1 Part One: General Information:

1. Type of Organization:

Table 4.1 shows the frequency and percent of each type of organization:

Table (4.1) Frequency and percent of each type of organisation

Type of Organization	Frequency	Percent %
Owner	17	19.32 %
Consultant	25	28.41 %
Contractor	46	52.27 %
Total	88	100.00 %

2. Typical of projects of organization:

Table 4.2 shows the percent of organizations projects types according to each type of target group:

Table (4.2) Percent of organizations projects types

Type of project	Owner	Consultant	Contractor
Buildings	34.9% (15)	35.6% (21)	41.3% (45)
Roads and transportation	30.2% (13)	28.8% (17)	27.5% (30)
Water and sewage	30.2% (13)	28.8% (17)	23.9% (26)
Others	4.7% (2)	6.8% (4)	7.3% (8)

3. Company size :(number of employees):

Average number of employees in owners' organizations is 50 employees

Average number of employees in consultants' organizations is 12 employees

Average number of employees in contractors' organizations is 10 employees

4. Job title of the respondent:

Table 4.3 shows the frequency and percent of job title of the respondent according to each type of target group:

Table (4.3) Frequency and percent of job title of the respondent

Job title of the respondent	Owner		Consultant		Contractor	
	Frequency	Percent%	Frequency	Percent%	Frequency	Percent%
Project Manager	3	17.6	5	20.0	13	28.3
Site Engineer	7	41.2	10	40.0	6	13.0
Organization Manager	2	11.8	7	28.0	23	50.0
Others	5	29.4	3	12.0	4	8.7
Total	17	100.0	25	100.0	46	100.0

5. Years of experience of the respondent:

Average number of experience years of the owners' respondents is 14 Years

Average number of experience years of the consultants' respondents is 13 Years

Average number of experience years of the contractors' respondents is 16 Years

6. Number of projects executed in the last five years:

Table 4.4 shows the frequency and percent of number of projects executed in the last five years according to each type of target group:

Table (4.4) Frequency and percent of number of projects executed in the last five years

Number of executed projects	Owner		Consultant		Contractor	
	Frequency	Percent%	Frequency	Percent%	Frequency	Percent%
1 to 10	2	11.8	7	28.0	25	54.3
11 to 20	5	29.4	4	16.0	11	23.9
21 to 30	2	11.8	3	12.0	3	6.5
More than 30	8	47.1	11	44.0	7	15.2
Total	17	100.0	25	100.0	46	100.0

7. Value of projects executed in the last five years: (in million dollars)

Table 4.5 shows the frequency and percent of value of projects executed in the last five years according to each type of target group:

Table (4.5) Frequency and percent of value of projects executed in the last five years

Value of executed projects	Owner		Consultant		Contractor	
	Frequency	Percent%	Frequency	Percent%	Frequency	Percent%
1 – less than 2 M	2	11.8	4	16.0	19	41.3
2 – less than 5 M	5	29.4	6	24.0	13	28.3
5 – less than 10 M	4	23.5	6	24.0	6	13.0
More than or equal 10 M	6	35.3	9	36.0	8	17.4
Total	17	100.0	24	100.0	46	100.0

4.2 Part Two: Factors Affecting the Performance of Construction Projects

The results of this part of study provide an indication of the relative importance index and rank of factors affecting the performance of construction projects in Gaza Strip. The following Table 4.6 show summary of factors ranking according to each type of target group.

Table (4.6) The relative importance index (RII) and rank of factors affecting the performance of construction projects in Gaza Strip according to each category

Factors	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
(1) Cost factors						
Market share of organization	0.600	54	0.709	39	0.726	39
Liquidity of organization	0.729	31	0.842	5	0.839	10
Cash flow of project	0.812	14	0.800	11	0.848	9
Profit rate of project	0.694	38	0.776	14	0.739	38
Overhead percentage of project	0.647	48	0.687	49	0.662	47
Project design cost	0.500	63	0.688	43	0.582	63
Material and equipment cost	0.812	14	0.776	14	0.813	16
Project labor cost	0.741	27	0.744	22	0.739	37
Project overtime cost	0.588	58	0.600	59	0.617	55
Motivation cost	0.600	54	0.584	61	0.609	58
Cost of rework	0.588	58	0.672	51	0.587	62
Cost of variation orders	0.565	62	0.688	43	0.662	46
Waste rate of materials	0.650	46	0.624	57	0.639	51
Regular project budget update	0.638	50	0.742	24	0.743	35
Cost control system	0.725	33	0.728	28	0.765	32
Escalation of material prices	0.847	5	0.832	7	0.889	4
Differentiation of coins prices	0.788	18	0.808	9	0.874	5

Factors	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
(2) Time factors						
Site preparation time	0.682	42	0.664	53	0.596	61
Planned time for project construction	0.753	26	0.760	18	0.765	30
Percentage of orders delivered late	0.694	40	0.768	17	0.774	29
Time needed to implement variation orders	0.706	35	0.704	40	0.693	43
Time needed to rectify defects	0.659	44	0.672	51	0.639	50
Average delay in claim approval	0.650	46	0.728	28	0.765	30
Average delay in payment from owner to contractor	0.824	11	0.776	14	0.839	11
Availability of resources as planned through project duration	0.871	3	0.858	2	0.904	3
Average delay because of closures and materials shortage	0.941	1	0.896	1	0.943	1
(3) Quality factors						
Conformance to specification	0.882	2	0.808	9	0.822	13
Availability of personals with high experience and qualification	0.859	4	0.848	3	0.865	6
Quality of equipments and raw materials in project	0.835	9	0.840	6	0.861	7
Participation of managerial levels with decision making	0.812	14	0.784	13	0.800	21
Quality assessment system in organization	0.706	35	0.712	35	0.743	34
Quality training/meeting	0.659	45	0.728	28	0.674	44
(4) Productivity factors						
Project complexity	0.729	31	0.712	35	0.761	33
Number of new projects / year	0.600	54	0.688	43	0.630	53
Management-labor relationship	0.776	22	0.688	43	0.796	22
Absenteeism rate through project	0.776	20	0.688	43	0.743	36
Sequencing of work according to schedule	0.800	17	0.816	8	0.804	20
(5) Client Satisfaction factors						
Information coordination between owner and project parties	0.729	29	0.792	12	0.809	19
Leadership skills for project manager	0.835	7	0.848	3	0.904	2
Speed and reliability of service to owner	0.718	34	0.744	22	0.822	13
Number of disputes between owner and project parties	0.753	24	0.728	28	0.720	40
Number of reworks	0.635	51	0.712	35	0.627	54
(6) Regular and community satisfaction factors						
Cost of compliance to regulators requirements	0.600	54	0.648	55	0.604	59
Number of non compliance to regulation	0.635	51	0.624	57	0.614	56
Quality and availability of regulator documentation	0.647	49	0.736	25	0.653	48
Neighbors and site conditions problems	0.788	18	0.712	35	0.707	41

Factors	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
(7) People factors						
Employee attitudes in project	0.682	41	0.728	28	0.795	23
Recruitment and competence development between employees	0.753	24	0.688	43	0.809	17
Employees motivation	0.765	23	0.696	42	0.791	24
Belonging to work	0.835	9	0.736	25	0.849	8
(8) Health and Safety factors						
Application of Health and safety factors in organization	0.700	37	0.728	28	0.787	25
Easiness to reach to the site (location of project)	0.694	38	0.704	40	0.774	28
Reportable accidents rate in project	0.729	29	0.680	50	0.600	60
Assurance rate of project	0.671	43	0.632	56	0.635	52
(9) Innovation and learning factors						
Learning from own experience and past history	0.847	5	0.752	20	0.818	15
Learning from best practice and experience of others	0.824	12	0.760	18	0.822	12
Training the human resources in the skills demanded by the project	0.835	7	0.720	34	0.787	26
Work group	0.776	20	0.736	25	0.787	27
Review of failures and solve them	0.824	12	0.752	20	0.809	17
(10) Environment factors						
Air quality	0.588	58	0.592	60	0.671	45
Noise level	0.565	61	0.512	63	0.613	57
Wastes around the site	0.635	51	0.584	61	0.649	49
Climate condition in the site	0.729	28	0.656	54	0.707	41

The most important factors agreed by the owners, consultants and contractors as the main factors affecting the performance of construction projects in the Gaza Strip were: escalation of material prices; availability of resources as planned through project duration; average delay because of closures and materials shortage; availability of personals with high experience and qualification; quality of equipments and raw materials in project; and leadership skills for project manager. This can be explained and shown by Table 4.7.

Table (4.7) the following factors are among the top significant factors affecting the performance of construction projects in Gaza Strip for all parties

Factors	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
Escalation of material prices	0.847	5	0.832	7	0.889	4
Availability of resources as planned through project duration	0.871	3	0.858	2	0.904	3
Average delay because of closures and materials shortage	0.941	1	0.896	1	0.943	1
Availability of personals with high experience and qualification	0.859	4	0.848	3	0.865	6
Quality of equipments and raw materials in project	0.835	9	0.840	6	0.861	7
Leadership skills for project manager	0.835	7	0.848	3	0.904	2

According to owners, consultants and contractors; it was obtained that the average delay because of closures and materials shortage was the most important performance factor as it has the first rank among all factors with relative index (RII) = 0.941 for owners, 0.896 for consultants and 0.943 for contractors. This agreement between all target groups is traced to the difficult political situation from which Gaza strip suffers. Construction projects in Gaza strip is suffering from a number of problems because of closures and materials shortage. These problems can be considered as an obstacle for time performance of projects. All owners, consultants and contractors feel with such this sensitive problem in their projects. In 2006 there were many projects in Gaza Strip which finished with poor time performance because of many reasons such as non-availability of materials and continuous closures (UNRWA, 2006). Construction projects in Gaza Strip suffered from difficult political and economical situation which lead to poor performance of projects (World Bank, 2004).

Availability of resources as planned through project duration has been ranked by the owners respondents in the third position with RII equal 0.871. It has been ranked by the consultants respondents in the second position with RII equal 0.858 and has been ranked by the contractors respondents in the third position with RII equal 0.904. This factor can be considered as an important for three parties and it has a similar rank for all parties as it affects directly on project performance such as time. Availability of resources is related to closures. If resources are not available as planned through project duration, the project will suffers from problem of time and cost performance.

This result is in line with Iyer and Jha (2005) as availability of resources as planned through project duration is an important factor for owners and contractors in Indian construction projects. This is because resource availability as planned schedule can improve time performance of projects.

Availability of personals with high experience and qualification has been ranked by the owners respondents in the fourth position with RII equal 0.859. It has been ranked by the consultants respondents in the third position with RII equal 0.848 and has been ranked by the contractors respondents in the sixth position with RII equal 0.865. This factor is more important for consultants than for others. Availability of personals with high experience and qualification lead to better performance of quality, time, cost, productivity and safety of projects. In the Gaza Strip, projects are awarded to the lowest bidder. Some of the lowest bidders may lack management skills and less attention is paid to contractor's plan, cost control, overall site management and resource allocation. Samson and Lema (2002), Cheung et al (2004) and Iyer and Jha (2005) are in agreement with our result as this factor is very important because it affects strongly on quality performance of construction projects.

Leadership skills for project manager has been ranked by the owners respondents in the seventh position with RII equal 0.835. It has been ranked by the consultants respondents in the third position with RII equal 0.848 and has been ranked by the contractors respondents in the second position with RII equal 0.904. This factor is considered as more important for contractors than for others. This is mainly because that if project manager has strong leadership skills, then the project performance can be monitored, controlled and managed with high quality. This result is in line with Iyer and Jha (2005) as this factor is more important for contractors than for owners because skills and quality of leadership affects strongly and directly on contractors performance through project.

Escalation of material prices has been ranked by the owners respondents in the fifth position with RII equal 0.847. It has been ranked by the consultants respondents in the seventh position with RII equal 0.832 and has been ranked by the contractors respondents in the fourth position with RII equal 0.889. This factor is considered as more important for contractors than for others because escalation of material prices

affects the cost performance of contractors. It should be mentioned that there were many projects in the Gaza Strip finished with poor cost performance because of escalation of material prices. This is because of boarders closures and construction materials shortage (UNRWA, 2006).

Quality of equipments and raw materials in project has been ranked by the owners respondents in the ninth position with RII equal 0.835. It has been ranked by the consultants respondents in the sixth position with RII equal 0.840 and has been ranked by the contractors respondents in the seventh position with RII equal 0.861. It is not surprising to obtain that this factor is more important for consultants than for others because that quality control is one of the most important duties for the consultant in the site of construction project. This will lead to owner satisfaction and implementation of project according to specifications. In Gaza Strip, most of available materials are with little variation in quality and produced by a limited number of producers. Cheung et al (2004) and Iyer and Jha (2005) are in agreement with our result as this factor affects the project performance and the degree of owners satisfaction.

However, there are some factors which can be considered as more important for one party than for others as shown in the Table 4.6. This is because contractors are interested with operational and managerial factors such as productivity and material availability. Unlike contractors, however, the owners and consultants considered the client and technical factors to be more important than operational ones.

Table 4.8 shows summary of factors ranking according to all categories:

Table (4.8) The relative importance index (RII) and rank of factors affecting the performance of construction projects in Gaza Strip according to all categories

Factors	All Response	
	RII	Rank
Average delay because of closures and materials shortage	0.930	1
Availability of resources as planned through project duration	0.885	2
Leadership skills for project manager	0.875	3
Escalation of material prices	0.864	4
Availability of personals with high experience and qualification	0.859	5
Quality of equipments and raw materials in project	0.850	6
Differentiation of coins prices	0.839	7

Factors	All Response	
	RII	Rank
Conformance to specification	0.830	8
Cash flow of project	0.827	9
Liquidity of organization	0.818	10
Average delay in payment from owner to contractor	0.818	11
Belonging to work	0.814	12
Sequencing of work according to schedule	0.807	13
Learning from own experience and past history	0.805	14
Learning from best practice and experience of others	0.805	15
Material and equipment cost	0.802	16
Participation of managerial levels with decision making	0.798	17
Review of failures and solve them	0.795	18
Information coordination between owner and project parties	0.789	19
Speed and reliability of service to owner	0.780	20
Training the human resources in the skills demanded by the project	0.777	21
Work group	0.770	22
Recruitment and competence development between employees	0.763	23
Planned time for project construction	0.761	24
Management-labor relationship	0.761	24
Employees motivation	0.759	26
Percentage of orders delivered late	0.757	27
Application of Health and safety factors in organization	0.754	28
Employee attitudes in project	0.753	29
Cost control system	0.747	30
Profit rate of project	0.741	31
Project complexity	0.741	31
Project labor cost	0.741	33
Easiness to reach to the site (location of project)	0.739	34
Absenteeism rate through project	0.734	35
Average delay in claim approval	0.733	36
Number of disputes between owner and project parties	0.729	37
Quality assessment system in organization	0.727	38
Neighbors and site conditions problems	0.724	39
Regular project budget update	0.723	40
Time needed to implement variation orders	0.699	41
Climate condition in the site	0.697	42
Market share of organization	0.696	43
Quality training/meeting	0.686	44
Quality and availability of regulator documentation	0.676	45
Overhead percentage of project	0.666	46
Number of reworks	0.653	47
Time needed to rectify defects	0.652	48
Cost of variation orders	0.651	49
Reportable accidents rate in project	0.648	50
Number of new projects / year	0.641	51
Assurance rate of project	0.641	52

Factors	All Response	
	RII	Rank
Waste rate of materials	0.637	53
Air quality	0.632	54
Site preparation time	0.632	55
Wastes around the site	0.628	56
Number of non compliance to regulation	0.621	57
Cost of compliance to regulators requirements	0.616	58
Cost of rework	0.611	59
Project overtime cost	0.607	60
Motivation cost	0.600	61
Project design cost	0.598	62
Noise level	0.575	63

The following table 4.9 shows the top ten significant factors affecting the performance of construction projects in Gaza Strip.

Table (4.9) the following factors are among the top ten significant factors affecting the performance of construction projects in Gaza Strip according to all categories

Factors	All Response	
	RII	Rank
Average delay because of closures and materials shortage	0.930	1
Availability of resources as planned through project duration	0.885	2
Leadership skills for project manager	0.875	3
Escalation of material prices	0.864	4
Availability of personals with high experience and qualification	0.859	5
Quality of equipments and raw materials in project	0.850	6
Differentiation of coins prices	0.839	7
Conformance to specification	0.830	8
Cash flow of project	0.827	9
Liquidity of organization	0.818	10

According to all response, average delay because of closures and materials shortage was the most important performance factor as it has the first rank among all factors with RII = 0.930. This importance is traced to the difficult political situation from which Gaza strip suffers. Construction projects in Gaza strip is suffering from complex problems because of closures and materials shortage. These problems can be considered as an obstacle for time performance of projects. All owners, consultants and contractors feel with such this sensitive problem in their projects. In 2006 there were many projects in Gaza Strip which finished with poor time performance because of many reasons such as non-availability of materials and continuous closures

(UNRWA, 2006). Construction projects in Gaza Strip suffered from difficult political and economical situation which lead to poor performance of projects (World Bank, 2004).

Availability of resources as planned through project duration has been ranked by all response in the second position with RII equal 0.885. This factor is considered as an important for all parties as it affects directly on project performance such as time. If resources are not available as planned through project duration, the project will suffers from problem of time and cost performance. This result is in line with Iyer and Jha (2005) as availability of resources as planned through project duration is an important factor for all response in Indian construction projects. This is because resource availability as planned schedule can improve time performance of projects.

Leadership skills for project manager has been ranked by all response in the third position with RII equal 0.875. If project manager has strong leadership skills, the project performance can be monitored, controlled and managed with high quality. This result is in line with Iyer and Jha (2005) as skills and quality of leadership affects strongly and directly on performance of construction project.

Escalation of material prices has been ranked by all response in the fourth position with RII equal 0.864. Escalation of material prices affects the cost performance of project. It was mentioned that there were many projects in the Gaza Strip finished with poor cost performance because of escalation of material prices (UNRWA, 2006).

Availability of personals with high experience and qualification has been ranked by all response in the fifth position with RII equal 0.859. Availability of personals with high experience and qualification lead to better performance of quality, time, cost, productivity and safety of projects. In Gaza Strip, projects are awarded to the lowest bidder. Some of the lowest bidders may lack management skills and less attention is paid to contractor's plan, cost control, overall site management and resource allocation. Samson and Lema (2002), Cheung et al (2004) and Iyer and Jha (2005) are in agreement with our result as this factor is very important because it affects strongly on quality performance of construction projects.

Quality of equipments and raw materials in project has been ranked by all response in the sixth position with RII equal 0.850. Quality control is one of the most important duties for the consultant in the site of construction project. This will lead to owner satisfaction and implementation of project according to specifications. In Gaza Strip, most of available materials are with little variation in quality and produced by a limited number of producers. Cheung et al (2004) and Iyer and Jha (2005) are in agreement with our result as this factor affects the project performance and the degree of owners satisfaction.

Differentiation of coins prices has been ranked by all response in the seventh position with RII equal 0.839. This factor affects the liquidity, project budget and cost performance. Construction projects in Gaza Strip suffered from differentiation of coins prices because of difficult political and economical situation (World Bank, 2004).

Conformance to specification has been ranked by all response in the eighth position with RII equal 0.830. This factor is an important for owner's satisfaction. The owner usually seeks to implement project according to specification. Iyer and Jha (2005) are in agreement with our result as this factor is significant for owners because this factor is strongly related to client satisfaction.

Cash flow of project has also been ranked by all response in the ninth position with RII equal 0.827. This is mainly because cash flow affects the project budget and project cost performance. This result is in agreement with Samson and Lema (2002) because cash flow can give an important evaluation for the cost performance at any stage of project.

Liquidity of organization has been ranked by all response in the tenth position with RII equal 0.818. Cost performance of any project depends mainly on liquidity of organization. This result is in line with Samson and Lema (2002) as liquidity of organization is very important for evaluation of project budget and cost performance.

Performance Categories

Table 4.10 shows the ten categories which affect the performance of construction projects.

Cost group has been ranked by the owners respondents in the eighth position with RII equal 0.679. It has been ranked by the consultants respondents in the fifth position with RII equal 0.724 and has been ranked by the contractors respondents in the seventh position with RII equal 0.726. This group is more important for consultant than for others because liquidity of organization and project design cost affect the project cost performance and this is related to owner satisfaction. Cheung et al (2004) are in line with our result as cost group affects strongly the performance of construction projects and it can be one of the most important indicators to measure performance. Iyer and Jha (2005) are in agreement with our result as cost is considered as an important criteria for judgment of construction projects performance.

Table (4.10) the relative importance index (RII) and rank of major groups affecting the performance of construction projects in Gaza Strip

Groups	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
Cost	0.679	8	0.724	5	0.726	7
Time	0.753	4	0.757	3	0.769	5
Quality	0.792	2	0.787	1	0.794	3
Productivity	0.736	5	0.718	6	0.747	6
Client Satisfaction	0.734	6	0.765	2	0.779	4
Regular and community satisfaction	0.668	9	0.680	9	0.646	10
People	0.759	3	0.712	7	0.812	1
Health and Safety	0.698	7	0.686	8	0.699	8
Innovation and learning	0.821	1	0.744	4	0.804	2
Environment	0.629	10	0.586	10	0.660	9

Time group has been ranked by the owners respondents in the fourth position with RII equal 0.753. It has been ranked by the consultants respondents in the third position with RII equal 0.757 and has been ranked by the contractors respondents in the fifth position with RII equal 0.769. This group is also more important for consultant than for others because the consultant is concerned with planned time for project completion. Samson and Lema (2002) remarked that time performance is affected by

schedule stability of construction projects. Cheung et al (2004) remarked that time group affects strongly the performance of construction projects and it can be one of the most important indicators to measure performance.

Quality group has been ranked by the owners respondents in the second position with RII equal 0.792. It has been ranked by the consultants respondents in the first position with RII equal 0.787 and has been ranked by the contractors respondents in the third position with RII equal 0.794. This group is the most important one for consultants because consultants are interested with clients and technical factors. Consultants observed that quality of equipments and raw materials in project and availability of personals with high qualification affect strongly the quality performance of project. Samson and Lema (2002) remarked that number of disputes and rework tasks through project affects the quality performance. Cheung et al (2004) remarked that quality group affects moderately on the performance of construction projects. Iyer and Jha (2005) observed that quality performance affects the cost performance of construction projects.

Productivity group has been ranked by the owners respondents in the fifth position with RII equal 0.736. It has been ranked by the consultants respondents in the sixth position with RII equal 0.718 and has been ranked by the contractors respondents in the sixth position with RII equal 0.747. It is obtained that this factor has a similar importance for three parties as productivity affects the cost, time and quality performance of projects. Samson and Lema (2002) remarked that productivity is an important indicator affecting the performance of construction projects.

Client satisfaction group has been ranked by the owners respondents in the sixth position with RII equal 0.734. It has been ranked by the consultants respondents in the second position with RII equal 0.765 and has been ranked by the contractors respondents in the fourth position with RII equal 0.779. It is interesting to observe that client satisfaction group is more important for consultants than for contractors because consultants are usually interested with client factors. This is mainly due to financing issues and owner interference which are considered very important by consultants. Samson and Lema (2002); Iyer and Jha (2005) obtained that client satisfaction is affected by information coordination between owner and project

parties. Cheung et al (2004) remarked that client satisfaction group affects moderately the performance of construction projects

Regular and community satisfaction group has been ranked by the owners respondents in the ninth position with RII equal 0.668. It has been ranked by the consultants respondents in the ninth position with RII equal 0.680 and has been ranked by the contractors respondents in the tenth position with RII equal 0.646. This group is not important for three parties because it rarely affect the project performance because of political situation in the Gaza Strip. Samson and Lema (2002) obtained that regular and community satisfaction group is one of set of projects performance indicators.

People group has been ranked by the owners respondents in the third position with RII equal 0.759. It has been ranked by the consultants respondents in the seventh position with RII equal 0.712 and has been ranked by the contractors respondents in the first position with RII equal 0.812. It is not surprising to observe that people group is the most important one for contractors because contractors remarked competence development between employees and belonging to work affect strongly on productivity, cost and time performance of contractors. Iyer and Jha (2005) obtained that people group affects the projects performance by participants' attitudes, commitment to the project, employees motivation and competence development.

Health and safety group has been ranked by the owners respondents in the seventh position with RII equal 0.698. It has been ranked by the consultants respondents in the eighth position with RII equal 0.686 and has been ranked by the contractors respondents in the eighth position with RII equal 0.699. It is obtained that this group is not important for three parties because safety is rarely considered or applied through implementation stage of construction projects in the Gaza Strip. Cheung et al (2004) and Ugwu and Haupt (2007) observed that health and safety group affects strongly the performance of construction projects. This might be due to different location, culture and management style.

Innovation and learning group has been ranked by the owners respondents in the first position with RII equal 0.821. It has been ranked by the consultants respondents in the

fourth position with RII equal 0.744 and has been ranked by the contractors respondents in the second position with RII equal 0.804. This group is the most important one for owners because owners remarked learning from experience and training the human resources with skills demanded by the project affect strongly the project performance. Samson and Lema (2002) and Iyer and Jha (2005) obtained that innovation and learning group affects the construction project performance by human trainings and experiences.

Environment group has been ranked by the owners respondents in the tenth position with RII equal 0.629. It has been ranked by the consultants respondents in the tenth position with RII equal 0.586 and has been ranked by the contractors respondents in the ninth position with RII equal 0.660. It is obtained that this group is not important for three parties because environmental factors such as air quality and noise level do not affect practically on the performance of projects in the Gaza Strip. Cheung et al (2004) remarked that environment group affects strongly the performance of construction projects. Iyer and Jha (2005) and Ugwu and Haupt (2007) observed that environment group affects moderately the performance of construction projects. This might be because of different location and environmental condition.

The following is a brief discussion of the ranking of factors for each group:

4.2.1 Group one: Cost factors:

The relative importance index (RII) and rank of cost factors are summarized in Table 4.11:

Table (4.11) RII and rank of cost factors

Factors	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
(1) Cost factors						
Market share of organization	0.600	12	0.709	10	0.726	10
Liquidity of organization	0.729	6	0.842	1	0.839	4
Cash flow of project	0.812	2	0.800	4	0.848	3
Profit rate of project	0.694	8	0.776	5	0.739	9
Overhead percentage of project	0.647	10	0.687	13	0.662	12
Project design cost	0.500	17	0.688	11	0.582	17

Factors	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
Material and equipment cost	0.812	2	0.776	5	0.813	5
Project labor cost	0.741	5	0.744	7	0.739	8
Project overtime cost	0.588	14	0.600	16	0.617	14
Motivation cost	0.600	12	0.584	17	0.609	15
Cost of rework	0.588	14	0.672	14	0.587	16
Cost of variation orders	0.565	16	0.688	11	0.662	11
Waste rate of materials	0.650	9	0.624	15	0.639	13
Regular project budget update	0.638	11	0.742	8	0.743	7
Cost control system	0.725	7	0.728	9	0.765	6
Escalation of material prices	0.847	1	0.832	2	0.889	1
Differentiation of coins prices	0.788	4	0.808	3	0.874	2

Owners view:

As expected, escalation of material prices has been ranked by the owners respondents in the first position with RII equal 0.847. It is worth noticing that this factor is the most important one for owners because continuous closures in the Gaza Strip lead to rapid shortage of construction materials and escalation of construction material prices. This escalation of material prices affect the liquidity of owners' projects and cost performance of their projects. It should be mentioned that construction projects in Gaza Strip suffered from difficult political and economical situation which lead to poor performance of projects (World Bank, 2004). In 2006 there were many projects in Gaza Strip finished with poor performance because of many reasons such as non-availability of materials and continuous closures (UNRWA, 2006).

Material and equipment cost has been ranked by the owners respondents in the second position with RII equal 0.812. This factor affects the owner's liquidity and project cost performance. This result is in line with Okuwoga (1998) as material and equipment cost in Nigeria construction projects is practically significant for owners because of poor cost control. However, the result of Iyer and Jha (2005) and Ugwu and Haupt (2007) are not in agreement with our result as this factor is not important to owners because cost of materials and equipments rarely affect the cost performance of construction projects. This might be due to different location, economical and political situation.

Cash flow of project has also been ranked by the owners respondents in the second position with RII equal 0.812. This mainly because cash flow affects the project budget and project cost performance. This result is in agreement with Samson and Lema (2002) because cash flow can give an important evaluation for the cost performance at any stage of project.

Differentiation of coins prices has been ranked by the owners respondents in the fourth position with RII equal 0.788. This factor affects the owners' liquidity, project budget and cost performance. Construction projects in Gaza Strip suffered from differentiation of coins prices because of difficult political and economical situation (World Bank, 2004).

Project labor cost has been ranked by the owners respondents in the fifth position with RII equal 0.741. This factor affects the cost performance of project because labor cost is one of the main components of project cost. The result of Ugwu and Haupt (2007) is not in line with our result because cost of labors in South Africa rarely affect the project budget and cost performance. This can be attributed to different location, regulations and laws.

Consultants view:

Liquidity of organization has been ranked by the consultants respondents in the first position with RII equal 0.842. Consultants considered this factor as the most important one because cost performance of any project depends mainly on liquidity of organization. This result is in line with Samson and Lema (2002) as liquidity of organization is very important for evaluation of project budget and cost performance. However, Ugwu and Haupt (2007) are not in agreement with our result as this factor is moderately important for consultants. This is mainly due to different economical and political situation.

Escalation of material prices has been ranked by the consultants respondents in the second position RII equal 0.832. Continuous closures in the Gaza Strip lead to rapid shortage of construction materials and escalation of construction material prices. This escalation of material prices affect the cost performance of projects which is related to

client's representative. There were many projects in Gaza Strip suffered from escalation of material prices because of boarders' closures and difficult availability of materials (UNRWA, 2006)

Differentiation of coins prices has been ranked by the consultants respondents in the third position with RII equal 0.808. This factor is related to clients' representative factors such as owners' liquidity and project budget. Construction projects in Gaza Strip suffered from differentiation of coins prices because of difficult political and economical situation (World Bank, 2004).

Cash flow of project has been ranked by the consultants respondents in the fourth position with RII equal 0.800. Cash flow can give an important evaluation for the cost performance at any stage of project. This result is in agreement with Samson and Lema (2002) as cash flow is a significant factor for cost performance evaluation.

Profit rate of project has been ranked by the consultants respondents in the fifth position with RII equal 0.776. Profit rate is an important indicator to evaluate cost performance of construction projects. Material and equipment cost has also been ranked by the consultant respondents in the fifth position with RII equal 0.776. Material and equipment cost is one of the main components of project budget affecting the performance of cost. DETR (2000) is in line with our result as these factors affect directly on business performance of project and organization.

Contractors view:

Escalation of material prices has been ranked by the contractors respondents in the first position with RII equal 0.889. This factor is the most important one for contractors because continuous closures of roads in the Gaza Strip lead to rapid shortage of construction materials and escalation of construction material prices. This escalation of material prices affect the liquidity of contractors and profit rate of their projects. Contractors in Gaza Strip suffered from escalation of construction material prices because of boarders' closures and difficult availability of materials (UNRWA, 2006)

Differentiation of coins prices has been ranked by the contractors respondents in the second position with RII equal 0.874. Differentiation of coins prices affects the project's profit rate for contractors and the contractors' cost performance. Contractors suffered from differentiation of coins prices because of difficult political and economical situation (World Bank, 2004).

Cash flow of project has been ranked by the contractors respondents in the third position with RII equal 0.848. This result is not surprising as most of contracting firms in the Gaza Strip have major problems in Cash flow. Cash flow can give an important evaluation for the contractors' cost performance at any stage of project. In addition, contractors can improve their cost performance based on continues cash flow review. This result is in line with Samson and Lema (2002) as cash flow is a significant factor for evaluation and measurement of construction contractors' performance.

Liquidity of organization has been ranked by the contractors respondents in the fourth position with RII equal 0.839. Cost performance of any construction project depends mainly on liquidity of organization. This result is in agreement with Samson and Lema (2002) as liquidity of organization is very important for evaluation of contractors' cost performance. However, Ugwu and Haupt (2007) are not in agreement with our result as this factor is not important for contractors in South Africa. This might be due to different economical and political situation.

Material and equipment cost has been ranked by the contractors respondents in the fifth position with RII equal 0.813. This factor is considered as one of project cost components. Therefore, material and equipment cost affects the contractors' profit rate and hence their cost performance. Iyer and Jha (2005) and Ugwu and Haupt (2007) are not in agreement with our result as cost of materials and equipments is not important to contractors and it rarely affect the cost performance. This can be attributed to different economical and political situation.

Comparison between owners, consultants and contractors:

Comparison between owners, consultants and contractors for cost factors are summarized in Table 4.12:

Table (4.12) Comparison between owners, consultants and contractors for cost factors

Factors	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
(1) Cost factors						
Escalation of material prices	0.847	1	0.832	2	0.889	1
Differentiation of coins prices	0.788	4	0.808	3	0.874	2
Cash flow of project	0.812	2	0.800	4	0.848	3
Material and equipment cost	0.812	2	0.776	5	0.813	5
Liquidity of organization	0.729	6	0.842	1	0.839	4

Escalation of material prices has been ranked by the owners and contractors respondents in the first position. However, this factor has been ranked by the consultants respondents in the second position. It is observed that this factor is more important for owners and contractors because escalation of material prices affects the liquidity of owners and the profit rate of contractors. Continuous closures of roads in the Gaza Strip lead to rapid shortage of construction materials and escalation of construction material prices. Construction projects in Gaza Strip suffered from escalation of construction material prices because of boarders' closures and difficult availability of materials (UNRWA, 2006)

Differentiation of coins prices has been ranked by the owners respondents in the fourth position. It has been ranked by the consultants respondents in the third position and has been ranked by the contractors respondents in the second position. It is not surprising to find out differentiation of coins prices is more important for contractors than for others because this factor affects the contractors' profit rate and cost performance. In Gaza Strip, contractors suffered from differentiation of coins prices because of difficult political and economical situation (World Bank, 2004).

Cash flow of project has been ranked by the owners respondents in the second position. It has been ranked by the consultants respondents in the fourth position and has been ranked by the contractors respondents in the third position. Cash flow is

more important for owners and contractors than for consultants because it can give an important evaluation for the owners' and the contractors' cost performance at any stage of project. Samson and Lema (2002) remarked that cash flow is a significant factor for evaluation and measurement of construction projects' cost performance.

Material and equipment cost has been ranked by the owners respondents in the second position but it has been ranked by the consultants and the contractors respondents in the fifth position. It is remarked that this factor is more important for owners than for others. Material and equipment cost is one of project cost components which affect the owners' liquidity and project budget. Iyer and Jha (2005) and Ugwu and Haupt (2007) are not in line with our result as materials and equipments cost rarely affect the cost performance of Indians' and South Africans' construction projects. This can be attributed to different economical and political situation.

Liquidity of organization has been ranked by the owners respondents in the sixth position. It has been ranked by the consultants respondents in the first position and has been ranked by the contractors respondents in the fourth position. Consultants considered this factor as the most important one because cost performance of any project depends mainly on liquidity of organization. This result is in line with Samson and Lema (2002) as liquidity of organization is very important for evaluation of project budget and cost performance. However, Ugwu and Haupt (2007) are not in agreement with our result as this factor is not important for owners and contractors and it is moderately important for consultants. This might be due to different economical and political situation.

4.2.2 Group two: Time factors:

The relative importance index (RII) and rank of time factors are summarized in Table 4.13:

Table (4.13) RII and rank of time factors

Factors	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
(2) Time factors						
Site preparation time	0.682	7	0.664	9	0.596	9
Planned time for project construction	0.753	4	0.760	5	0.765	5
Percentage of orders delivered late	0.694	6	0.768	4	0.774	4
Time needed to implement variation orders	0.706	5	0.704	7	0.693	7
Time needed to rectify defects	0.659	8	0.672	8	0.639	8
Average delay in claim approval	0.650	9	0.728	6	0.765	5
Average delay in payment from owner to contractor	0.824	3	0.776	3	0.839	3
Availability of resources as planned through project duration	0.871	2	0.858	2	0.904	2
Average delay because of closures and materials shortage	0.941	1	0.896	1	0.943	1

Owners view:

Average delay because of closures and materials shortage has been ranked by the owner respondents in the first position with RII equal 0.941. This factor is the most important one for owners because construction projects in Gaza strip is suffering from time performance problems such as delay due to closures and materials shortage. Owners usually feel with this sensitive problem in their projects. Construction projects in Gaza Strip suffered from time performance problem because of boarders' closures and difficult availability of materials (UNRWA, 2006)

Availability of resources as planned through project duration has been ranked by the owner respondents in the second position with RII equal 0.871. This factor affects directly and practically on project performance such as time. If resources are not available as planned through project duration, the project will suffer from problem of time and cost performance. This result is in line with Samson and Lema (2002) as it

is remarked that resource availability affects on processes performance of construction projects. In addition, Iyer and Jha (2005) and Ugwu and Haupt (2007) are in agreement with our result because availability of resources as planned through project duration is an important factor for owners in Indian and South African construction projects. This is because resource availability as planned schedule can improve time performance of projects.

Average delay in payment from owner to contractor has been ranked by the owner respondents in the third position with RII equal 0.824. Delay in payment from owner to contractor lead to delay of contractors' performance and cause problem in time performance. This may also lead to disputes and claims between owner and contractor of project. All of that will affect the overall performance of project which has been implemented. Karim and Marosszeky (1999) are in line with our result because that average delay in payment from owner to contractor affects the time performance and causes delay of project.

Planned time for project construction has been ranked by the owner respondents in the fourth position with RII equal 0.753. Planned time for project construction may not be suitable practically. If planned time is not suitable for implementation, the performance of project will suffers from delay and disputes between the owner and other parties of project. Owners usually want their projects to finish as early as possible. Cheung et al (2004) and Iyer and Jha (2005) are in agreement with our result as planned time for project construction is an important for owners because this factor affects strongly the time performance.

Time needed to implement variation orders has been ranked by the owner respondents in the fifth position with RII equal 0.706. Time needed to implement variation orders will affect the performance of basic schedule. Therefore, this will affect the time performance. This result is in line with Samson and Lema (2002) and Cheung et al (2004) as this factor affects strongly the time performance. For example, estimated schedule will be changed and modified.

Consultants view:

Average delay because of closures and materials shortage has been ranked by the consultants respondents in the first position with RII equal 0.896. This factor is the most important one for consultants because construction projects in Gaza strip is suffering from time performance problems such as delay due to closures and materials shortage. Consultants usually feel with this sensitive problem in their projects. Construction projects in Gaza Strip suffered from delay because of boarders' closures and difficult availability of materials (UNRWA, 2006).

Availability of resources as planned through project duration has been ranked by the consultants respondents in the second position with RII equal 0.858. This factor affects directly and practically on project performance such as time. If resources are not available as planned through project duration, the project will suffer from problem of time performance. This result is in agreement with Samson and Lema (2002) and Ugwu and Haupt (2007) as resource availability is an important factor for consultants because it affects the processes performance of construction projects.

Average delay in payment from owner to contractor has been ranked by the consultants respondents in the third position with RII equal 0.776. Delay in payment from owner to contractor lead to delay of project performance. This may also lead to disputes and claims between consultant and contractor of project. All of that will affect the overall performance of project which has been implemented. Karim and Marosszeky (1999) are in line with our result as the average delay in payment from owner to contractor affects the time performance because it causes delay of project.

Percentage of orders delivered late has been ranked by the consultants respondents in the fourth position with RII equal 0.768. When orders from consultant to contractor are delivered late, time performance of project will also be delayed. Then the schedule of project will be affected. This result is in agreement with Karim and Marosszeky (1999) because this factor affects strongly on time performance.

Planned time for project construction has been ranked by the consultants respondents in the fifth position with RII equal 0.760. Planned time for project construction may

not be suitable practically. Therefore, the performance of project will suffer from delay and disputes between consultant and contractor. Cheung et al (2004) is in line with our result as this factor affects strongly on time performance.

Contractors view:

Average delay because of closures and materials shortage has been ranked by the contractors respondents in the first position with RII equal 0.943. This factor is the most important one for contractors because construction projects in Gaza strip is suffering from complex problems due to closures and materials shortage. These problems can be considered as an obstacle for time performance of projects and leads to project delay. Contractors usually feel with this sensitive problem in their projects in Gaza strip. Contractors in Gaza Strip suffered from delay because of boarders' closures and materials shortage (UNRWA, 2006).

Availability of resources as planned through project duration has been ranked by the contractors respondents in the second position with RII equal 0.904. This factor affects directly and practically on contractors' performance through projects. If resources are not available for contractors as planned through project duration, the project will suffer from problem of time and cost performance. This result is in line with Samson and Lema (2002) because resource availability affects on processes performance of contractors. However, Iyer and Jha (2005) and Ugwu and Haupt (2007) are not in agreement with our result as availability of resources as planned through project duration is not important for contractors and it is rarely affects the contractors' time performance. This might be due to different location, political and economical situation.

Average delay in payment from owner to contractor has been ranked by the contractors respondents in the third position with RII equal 0.839. Delay in payment from owner to contractor lead to delay of contractors' performance and cause problem in time performance. This may also lead to disputes and claims between contractor and consultant of project. All of that will affect the overall performance of project that has been implemented. Karim and Marosszeky (1999) are in line with our result as the

average delay in payment from owner to contractor affects the time performance because it causes project delay.

Percentage of orders delivered late has been ranked by the contractors respondents in the fourth position with RII equal 0.774. When orders from consultant to contractor are delivered late, time performance of contractor will also be delayed. The contractor cannot implement any stage through project without having orders from project's consultant. This result is in agreement with Karim and Marosszeky (1999) because this factor affects strongly on time performance.

Planned time for project construction has been ranked by the contractors respondents in the fifth position with RII equal 0.765. Planned time for project construction may not be suitable practically. Therefore, the performance of project will suffer from delay and disputes between contractor and consultant. Cheung et al (2004) and Iyer and Jha (2005) are in line with our result as planned time for project construction is an important for contractors because this factor affects strongly on contractors performance for project time.

Comparison between owners, consultants and contractors:

Comparison between owners, consultants and contractors for time factors are summarized in Table 4.14:

Table (4.14) Comparison between owners, consultants and contractors for time factors

Factors	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
(2) Time factors						
delay because of closures and materials shortage	0.941	1	0.896	1	0.943	1
Availability of resources as planned through project duration	0.871	2	0.858	2	0.904	2
Average delay in payment from owner to contractor	0.824	3	0.776	3	0.839	3
Percentage of orders delivered late	0.694	6	0.768	4	0.774	4
Planned time for project construction	0.753	4	0.760	5	0.765	5

According to owners, consultants and contractors; the average delay because of closures and materials shortage was the most important performance factor as it has the first rank among all factors with RII = 0.941 for owners, 0.896 for consultants and 0.943 for contractors. This agreement between all target groups is traced to the difficult political situation from which Gaza strip suffers. Construction projects in Gaza strip is suffering from complex problems because of closures and materials shortage. These problems can be considered as an obstacle for time performance of projects. All owners, consultants and contractors feel with this sensitive problem in their projects. Contractors in Gaza Strip suffered from delay because of boarders' closures and materials shortage (UNRWA, 2006).

Availability of resources as planned through project duration has been ranked by the owners respondents in the third position. It has been ranked by the consultants respondents in the second position and has been ranked by the contractors respondents in the third position. This factor can be considered as an important for three parties and has a similar rank for all of them. This factor is related to closures and it affects directly on project performance such as time. If resources are not available as planned through project duration, the project will suffer from problem of time performance. This result is in line with Iyer and Jha (2005) because availability of resources as planned through project duration has a similar RII for owners, client representatives and contractors.

Average delay in payment from owner to contractor has been ranked by the owners, consultants and contractors respondents in the third position. This agreement between parties is traced to disputes which will happen between project's parties when the payment from owner is delayed. This will affect the performance of project specially time criteria. Karim and Marosszeky (1999) are in agreement with our result as the average delay in payment from owner to contractor affects the time performance.

Percentage of orders delivered late has been ranked by the owners respondents in the sixth position and has been ranked by the consultants and contractors respondents in the fourth position. This factor has the same rank for contractors and consultants and it is more important for them because it is related to contractual relationships between them. The contractor cannot implement any stage through project without having

orders from project's consultant. Karim and Marosszeky (1999) is in line with our result because this factor affects strongly on time performance

Planned time for project construction has been ranked by the owners respondents in the fourth position and has been ranked by the consultants and contractors respondents in the fifth position. This factor is more important for owners as they usually want their projects to finish as early as possible. Cheung et al (2004) and Iyer and Jha (2005) are in agreement with our result because this factor affects strongly on time performance and it is considered as an important for owners.

4.2.3 Group three: Quality factors:

The relative importance index (RII) and rank of quality factors are summarized in Table 4.15:

Table (4.15) RII and rank of quality factors

Factors	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
(3) Quality factors						
Conformance to specification	0.882	1	0.808	3	0.822	3
Availability of personals with high experience and qualification	0.859	2	0.848	1	0.865	1
Quality of equipments and raw materials in project	0.835	3	0.840	2	0.861	2
Participation of managerial levels with decision making	0.812	4	0.784	4	0.800	4
Quality assessment system in organization	0.706	5	0.712	6	0.743	5
Quality training/meeting	0.659	6	0.728	5	0.674	6

Owners view

Conformance to specification has been ranked by the owners respondents in the first position with RII equal 0.882. This factor is the most important one for owners because this factor is an important to owner's satisfaction. The owner usually seeks to implement project according to specification. Iyer and Jha (2005) are in agreement with our result as this factor is significant for owners because this factor is strongly related to client satisfaction.

Availability of personals with high experience and qualification has been ranked by the owners respondents in the second position with RII equal 0.859. Availability of personals with high experience and qualification in project lead to implementation of project with suitable cost, time and with professional quality which satisfy the owner. This result is related to Cheung et al (2004) and Iyer and Jha (2005) results as this factor affects strongly on project performance because it affects strongly the degree of owners satisfaction.

Quality of equipments and raw materials in project has been ranked by the owners respondents in the third position with RII equal 0.835. The owners usually want materials used in their project with a good quality and according to specification. In Gaza Strip, most of available materials are with little variation in quality and produced by a limited number of producers. Based on Cheung et al (2004) and Iyer and Jha (2005), this factor affects the project performance and the degree of owners satisfaction.

Participation of managerial levels with decision-making has been ranked by the owners respondents in the fourth position with RII equal 0.812. If managerial levels share with decision making, this will lead to better implementation of project and this will satisfy the owner with more degree. Iyer and Jha (2005) are in agreement with our result as this factor is practically significant for owners because decision-making depends mainly on work group and participation of working levels.

Quality assessment system in organization has been ranked by the owners respondents in the fifth position with RII equal 0.706. Quality assessment system in organization is rarely achieved or implemented through construction projects in the Gaza Strip. This result is in line with Iyer and Jha (2005) and Ugwu and Haupt (2007) as this factor is not significant to owners because of absence of practical quality assessment system in Indian and South African construction projects. However, Samson and Lema (2002) are not in line with our result as this factor affects on contractors performance.

Consultants view

Availability of personals with high experience and qualification has been ranked by the consultants respondents in the first position with RII equal 0.848. This factor is the most important one for consultants because availability of personals with high experience and qualification assist consultants to supervise the project with a good professionalism and also this assist them to satisfy the owner with a successful performance of project. This result is in agreement with Cheung et al (2004) and Iyer and Jha (2005) as this factor affects strongly on project performance because it affects strongly the degree of owners satisfaction which is one of the main responsibilities of consultants.

Quality of equipments and raw materials in project has been ranked by the consultants respondents in the second position with RII equal 0.840. Consultants usually want materials used in supervised project with a good quality and according to specification. Based on Cheung et al (2004) and Iyer and Jha (2005), this factor affects the project performance and the degree of owners satisfaction which is one of the main responsibilities of consultants.

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Conformance to specification has been ranked by the consultants respondents in the third position with RII equal 0.808. This factor is an important to client representative satisfaction because it is mainly related to owner satisfaction. Iyer and Jha (2005) are in agreement with our result as this factor is significant for client representative because this factor is strongly related to client satisfaction.

Participation of managerial levels with decision-making has been ranked by the consultants respondents in the fourth position with RII equal 0.784. If managerial levels share with decision making, this will lead to better performance of project and this will satisfy the client representative with more degree. Iyer and Jha (2005) are in agreement with our result as this factor is practically significant for client representative because decision-making depends mainly on participation of working levels.

Quality training/meeting has been ranked by the consultants respondents in the fifth position with RII equal 0.728. Quality training/meeting is rarely achieved or implemented in construction projects in the Gaza Strip. However, this result is not in agreement with Samson and Lema (2002) as this factor affects strongly on quality performance of construction projects.

Contractors view

Availability of personals with high experience and qualification has been ranked by the contractors respondents in the first position with RII equal 0.865. This factor is the most important one for contractors because availability of personals with high experience and qualification assist contractors to implement their projects with a successful and suitable performance. In Gaza Strip, the majority of site managers are civil engineers with good work experience but little training or education in management. Samson and Lema (2002), Cheung et al (2004) and Iyer and Jha (2005) are in line with our result as this factor is very important to contractors because it affects strongly on quality performance of construction projects.

Quality of equipments and raw materials in project has been ranked by the contractors respondents in the second position with RII equal 0.861. Contractors must implement their projects according to required and agreed quality because owners and consultants usually want materials used in supervised project according to specification and agreement. Based on Cheung et al (2004) and Iyer and Jha (2005), this factor affects the quality performance and the degree of owners and consultants satisfaction.

Conformance to specification has been ranked by the contractors respondents in the third position with RII equal 0.822. This factor is significant for contractors as it is relate to consultants and owners satisfaction. Iyer and Jha (2005) are in agreement with our result as this factor is significant for contractors because this factor is related to consultants and clients satisfaction.

Participation of managerial levels with decision-making has been ranked by the contractors respondents in the fourth position with RII equal 0.800. If managerial

levels share with decision making, this will lead to better performance of project and this will satisfy both of consultant and owner with more degree. Iyer and Jha (2005) are in agreement with our result as this factor is practically significant for contractors because decision-making depends mainly on participation of working levels.

Quality assessment system in organization has been ranked by the contractors respondents in the fifth position with RII equal 0.743. Quality assessment system in organization is rarely achieved or implemented for contractors in the Gaza Strip. Ugwu and Haupt (2007) are in agreement with our result as this factor is not important to contractors because of absence of quality assessment systems in South African construction projects. However, Samson and Lema (2002) and Iyer and Jha (2005) are not in line with our result as this factor is significant for contractors performance in Tanzania and India construction projects. This maight be due to different location and different managerial properties.

Comparison between owners, consultants and contractors:

Comparison between owners, consultants and contractors for quality factors are summarized in Table 4.16:

Table (4.16) Comparison between owners, consultants and contractors for quality factors

Factors	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
(3) Quality factors						
Participation of managerial levels with decision-making	0.812	4	0.784	4	0.800	4
Availability of personals with high experience and qualification	0.859	2	0.848	1	0.865	1
Conformance to specification	0.882	1	0.808	3	0.822	3
Quality of equipments and raw materials in project	0.835	3	0.840	2	0.861	2

Participation of managerial levels with decision-making has been ranked by the owners, consultants and contractors respondents in the fourth position. This factor has the same rank for all parties because sharing of managerial levels with decision-making will lead to better implementation and performance of project and this will

satisfy the three parties with more degree. Iyer and Jha (2005) are in agreement with our results as this factor in an important to three parties because that will improve overall performance of construction project.

Availability of personals with high experience and qualification has been ranked by consultants and contractors respondents in the first position and has been ranked by owners respondents in the second position. However, this factor is very important for three parties because availability of personals with high experience and qualification assist them to implement their project with a professional and successful performance. Samson and Lema (2002), Cheung et al (2004) and Iyer and Jha (2005) are in line with our result as this factor is very important to three parties because it affects strongly on quality performance of construction projects.

Conformance to specification has been ranked in the first position for owners but it has been ranked in the third position for both of consultants and contractors. This factor is more important for owners as it is significant and related to client satisfaction. The owners usually seek to implement their project according to required specifications. Iyer and Jha (2005) are in line with our result as this factor is significant for owners because it is strongly related to client satisfaction.

Quality of equipments and raw materials in project has been ranked by the consultants and contractors respondents in the second position and has been ranked by the owner respondent in the third position. This factor is more important for consultant and contractor than for owner as they usually want materials used in project with a good quality and according to specification. Based on Cheung et al (2004) and Iyer and Jha (2005), this factor affects the project performance and the degree of owners satisfaction which is one of the main responsibilities of contractors and consultants.

4.2.4 Group four: Productivity factors:

The relative importance index (RII) and rank of productivity factors are summarized in Table 4.17:

Table (4.17) RII and rank of productivity factors

Factors	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
(4) Productivity factors						
Project complexity	0.729	4	0.712	2	0.761	3
Number of new projects / year	0.600	5	0.688	3	0.630	5
Management-labor relationship	0.776	2	0.688	3	0.796	2
Absenteeism rate through project	0.776	2	0.688	3	0.743	4
Sequencing of work according to schedule	0.800	1	0.816	1	0.804	1

Owners view:

Sequencing of work according to schedule has been ranked by the owners respondents in the first position with RII equal 0.800. This factor is the most important one for owners because sequencing of work according to schedule assists the owner to deliver project according to scheduled time for project completion. Samson and Lema (2002) are in agreement with our result as sequencing of work affects the productivity performance of construction projects.

Absenteeism rate through project has been ranked by the owners respondents in the second position with RII equal 0.776. Absenteeism through project will affect the productivity performance of project. Therefore, the owner will suffer from delay of project. This result is in agreement with Samson and Lema (2002) and Iyer and Jha (2005) as it is remarked that absenteeism through project implementation is very important for owners because it affects on productivity performance of construction projects.

Management-labor relationship has also been ranked by the owners respondents in the second position with RII equal 0.776. Management-labor relationship can assist for strong coordination and motivation between labor level and managerial level. This will assist for implementation of project with success productivity and good performance. All of that will satisfy the owner of project. This result is in line with Samson and Lema (2002) as management-labor relationship is significant for productivity performance of construction projects. However, Iyer and Jha (2005) are

not in agreement with our result as this factor is moderately important for owners in Indian construction projects. This might be due to different location and culture.

Project complexity has been ranked by the owners respondents in the fourth position with RII equal 0.729. Project complexity affect the degree of overall performance through project. Iyer and Jha (2005) are not in line with our result as this factor is moderately important for owners. In addition, Ugwu and Haupt (2007) are not in agreement with our result as this factor is not important for owners. This might be due to different locations and projects types.

Number of new projects / year has been ranked by the owners respondents in the fifth position with RII equal 0.600. Number of new projects / year rarely affect practically on performance of projects. This is because experiences and skills depend on number of executed projects.

Consultants view:

Sequencing of work according to schedule has been ranked by the consultants respondents in the first position with RII equal 0.816. This factor is the most important one for consultant because sequencing of work according to schedule assists consultant to deliver project to the owner according to scheduled time for project completion. Samson and Lema (2002) are in agreement with our result as sequencing of work affects the productivity performance of construction projects.

Project complexity has been ranked by the consultants respondents in the second position with RII equal 0.712. Degree of project complexity is correlated with experiences required for supervision and skills needed to monitor and supervise performance of project. Iyer and Jha (2005) are not in line with our result as this factor is moderately important for client representatives in Indian construction projects. In addition, Ugwu and Haupt (2007) are not in agreement with our result as this factor is not important for consultants. This might be because of different locations and projects types.

Absenteeism rate through project has been ranked by the consultants respondents in the third position with RII equal 0.688. Absenteeism through project will affect the productivity and time performance of project. Samson and Lema (2002) are in agreement with our result as absenteeism affects the productivity performance of construction projects.

Management-labor relationship has also been ranked by the consultants respondents in the third position with RII equal 0.688. Management-labor relationship can assist for strong coordination and motivation between contractor level and consultant level. This will lead to implement project with success supervision and so good performance of consultant. This result is in agreement with Samson and Lema (2002) as management-labor relationship is significant for productivity performance of construction projects.

Number of new projects / year has also been ranked by the consultants respondents in the third position with RII equal 0.688. Number of new projects / year affect the degree of experiences and skills learned from executed projects and that will affect the degree of consultant performance according to previous or current experiences.

Contractors view:

Sequencing of work according to schedule has been ranked by the contractors respondents in the first position with RII equal 0.804. This factor is the most important one for contractors because sequencing of work according to schedule assists contractors to implement project according to scheduled time for project completion. Therefore, the contractors will not suffer from time and cost performance problems. Samson and Lema (2002) are in line with our result as sequencing of work affects the productivity performance of contractors.

Management-labor relationship has been ranked by the contractors respondents in the second position with RII equal 0.796. Management-labor relationship can assist for strong coordination and motivation between labor level and managerial level. This will lead to implement project with success productivity and suitable time

performance of project. Samson and Lema (2002) are in agreement with our result as management-labor relationship is significant for productivity performance of construction projects. However, Iyer and Jha (2005) are not in agreement with our result as this factor is moderately important for contractors. This might be due to different location, culture and management coordination.

Project complexity has been ranked by the contractors respondents in the third position with RII equal 0.761. Degree of project complexity is related with experiences required for implementation and skills needed to construct project. All of that affect on the degree of contractors performance. Ugwu and Haupt (2007) are in line with our result as this factor is an important for contractors because performance of construction projects mainly depends up on project complexity. However, Iyer and Jha (2005) are not in agreement with our result as this factor is moderately important for contractors in India. This might be because of different location and construction projects nature.

Absenteeism rate through project has been ranked by the contractors respondents in the fourth position with RII equal 0.743. Absenteeism through project will affect the productivity. The contractor will suffer from time performance problem. This result is in agreement with Samson and Lema (2002) and Iyer and Jha (2005) as absenteeism through project implementation is very important for contractors because it affects the productivity performance of contractors.

Number of new projects / year has been ranked by the contractors respondents in the fifth position with RII equal 0.630. Number of new projects / year rarely affect practically on construction contractors performance. This is because experiences and skills depend on number of executed projects.

Comparison between owners, consultants and contractors:

Comparison between owners, consultants and contractors for productivity factors are summarized in Table 4.18:

Table (4.18) Comparison between owners, consultants and contractors for productivity factors

Factors	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
(4) Productivity factors						
Sequencing of work according to schedule	0.800	1	0.816	1	0.804	1
Management-labor relationship	0.776	2	0.688	3	0.796	2
Number of new projects / year	0.600	5	0.688	3	0.630	5

Sequencing of work according to schedule has been ranked by owners, consultants and contractors in the first position. This factor is the most important one for three parties because sequencing of work according to schedule assists them to perform project according to scheduled time for project completion. Therefore, there is no delay or cost overruns. Samson and Lema (2002) are in line with our result as sequencing of work affects the productivity performance of contractors.

Management-labor relationship has been ranked by owners and contractors respondents in the second position and has been ranked by consultants respondents in the third position. However, this factor is considered as an important for three parties as management-labor relationship can assist them for strong coordination and motivation between labor level and managerial level. This will lead to implement project with success productivity and so good performance of project. This result is in line with Samson and Lema (2002) as management-labor relationship is significant for productivity performance of construction projects. However, Iyer and Jha (2005) are not in agreement with our result as this factor is moderately important for owners and contractors. This might be due to different location and culture.

Number of new projects / year has been ranked by owners and contractors respondents in the fifth position and has been ranked by consultant respondents in the third position. This factor is considered more important for consultants. Owners and contractors considered that number of new projects / year rarely affect the performance of projects. Otherwise, consultants considered that number of new projects / year affect the degree of experiences and skills learned from executed

projects and that will affect the degree of project performance based on previous or current experiences.

4.2.5 Group five: Client Satisfaction factors:

The relative importance index (RII) and rank of client satisfaction factors are summarized in Table 4.19:

Table (4.19) RII and rank of client satisfaction factors

Factors	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
(5) Client satisfaction factors						
Information coordination between owner and project parties	0.729	3	0.792	2	0.809	3
Leadership skills for project manager	0.835	1	0.848	1	0.904	1
Speed and reliability of service to owner	0.718	4	0.744	3	0.822	2
Number of disputes between owner and project parties	0.753	2	0.728	4	0.720	4
Number of reworks	0.635	5	0.712	5	0.627	5

Owners view:

Leadership skills for project manager have been ranked by the owners respondents in the first position with RII equal 0.835. This factor is the most important one for owners because leadership skills for project manager affect the degree of project performance and client satisfaction. This result is in line with Cheung et al (2004) as this factor is an important for effectiveness on project performance. Otherwise, Iyer and Jha (2005) are not in agreement with our result as this factor is moderately important for owners. This might be due to different location and management style.

Number of disputes between owner and project parties have been ranked by the owners respondents in the second position with RII equal 0.753. Disputes between owner and project parties will affect on relationship between them and also the degree of client satisfaction will be decreased. All of that can affect the performance of project. Samson and Lema (2002) and Iyer and Jha (2005) are in agreement with our result as this factor is high important for owners because number of disputes affects strongly on client satisfaction and project performance.

Information coordination between owner and project parties has been ranked by the owners respondents in the third position with RII equal 0.729. Information coordination between owner and project parties will lead to strong relationship between them and the client will be more satisfied. Samson and Lema (2002) and Cheung et al (2004) are in line with our result as this factor is an important for effectiveness on construction project performance because information coordination affects on client satisfaction. On the other hand, Iyer and Jha (2005) are not in agreement with our result as this factor is moderately important for owners. This might be because of different location and culture.

Speed and reliability of service to owner has been ranked by the owners respondents in the fourth position with RII equal 0.718. This factor increases the degree of satisfaction with respect to client. This result is in line with Cheung et al (2004) and Iyer and Jha (2005) as this factor this factor is very important for owners because it affects strongly on client satisfaction.

Number of reworks has been ranked by the owners respondents in the fifth position with RII equal 0.635. This factor has an effect on client satisfaction and project performance. Samson and Lema (2002) are in agreement with our result as number of reworks affects on project performance because it affects the client satisfaction through project.

Consultants view:

Leadership skills for project manager have been ranked by the consultants respondents in the first position with RII equal 0.848. This factor is the most important one for consultants because leadership skills for project manager assist consultants to supervise the project with strong and suitable performance. This will convenient and satisfy the client of project. Cheung et al (2004) is in line with our result as this factor is an important for effectiveness on project performance because client satisfaction depends up on it.

Information coordination between owner and project parties has been ranked by the consultants respondents in the second position with RII equal 0.792. Information coordination between owner and project parties will lead to strong relationship between owner and consultant. Therefore, the client will be more satisfied. Samson and Lema (2002) and Cheung et al (2004) are in agreement with our result as this factor is an important for effectiveness on construction project performance because it affects the client satisfaction.

Speed and reliability of service to owner has been ranked by the consultants respondents in the third position with RII equal 0.744. Speed and reliability of service from consultant to owner affect the degree of satisfaction with respect to client. Cheung et al (2004) are in line with our result as this factor is an important for effectiveness on construction project performance because it affects strongly on client satisfaction.

Number of disputes between owner and project parties have been ranked by the consultants respondents in the fourth position with RII equal 0.728. Disputes between owner and consultant will affect on relationship between them and the degree of client satisfaction will be affected. Al of that can affects the performance of project. Samson and Lema (2002) are in agreement with our result as this factor is an important for construction project performance because it affects strongly on client satisfaction.

Number of reworks has been ranked by the consultants respondents in the fifth position with RII equal 0.712. This factor has an effect on client satisfaction and project performance. Samson and Lema (2002) are in line with our result as number of reworks affects the project performance because it affects the client satisfaction.

Contractors view:

Leadership skills for project manager have been ranked by the contractors respondents in the first position with RII equal 0.904 for contractors. This factor is the most important one for contractors because leadership skills for project manager affect the construction contractors performance. Cheung et al (2004) and Iyer and Jha

(2005) are in line with our result as this factor is an important for contractors because it is significant for effectiveness on project performance.

Speed and reliability of service to owner has been ranked by the contractors respondents in the second position with RII equal 0.822. Speed and reliability of service from contractor to client representative affect the degree of satisfaction with respect to client. This result is in agreement with Cheung et al (2004) as this factor affects strongly on project performance because it affects the client satisfaction degree. On the other side, Iyer and Jha (2005) are not in line with our result as this factor is not important for contractors. This might be because of different location and culture.

Information coordination between owner and project parties has been ranked by the contractors respondents in the third position with RII equal 0.809 for contractors. Information coordination between owner and project parties will lead to success construction contractors performance and strong relationship between project parties. Samson and Lema (2002) Cheung et al (2004) are in agreement with our result as this factor is an important for contractors because information coordination affects the client satisfaction and project performance. However, Iyer and Jha (2005) are not in line with our result as this factor is moderately important for contractors. This might be due to different location and management style.

Number of disputes between owner and project parties have been ranked by the contractors respondents in the fourth position with RII equal 0.720. Disputes between owner and contractor will affect the relationship between them and the degree of client satisfaction will be affected. Al of that affects on performance of contractors. Samson and Lema (2002) and Iyer and Jha (2005) are in agreement with our result as this factor is high important for contractors because number of disputes affects strongly on client satisfaction and construction contractors performance.

Number of reworks has been ranked by the contractors respondents in the fifth position with RII equal 0.627. This factor has an effect on client satisfaction and contractors performance. Samson and Lema (2002) are in line with our result as

number of reworks affects the contractors performance because it affects the client satisfaction.

Comparison between owners, consultants and contractors:

Comparison between owners, consultants and contractors for client satisfaction factors are summarized in Table 4.20:

Table (4.20) Comparison between owners, consultants and contractors for client satisfaction factors

Factors	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
(5) Client satisfaction factors						
Leadership skills for project manager	0.835	1	0.848	1	0.904	1
Number of reworks	0.635	5	0.712	5	0.627	5
Number of disputes between owner and project parties	0.753	2	0.728	4	0.720	4
Information coordination between owner and project parties	0.729	3	0.792	2	0.809	3

Leadership skills for project manager have been ranked by owners, consultants and contractors respondents in the first position. This factor is the most important one for three parties because leadership skills for project manager affect the degree of project performance and client satisfaction. Cheung et al (2004) observed that this factor is an important for effectiveness on project performance. Cheung et al (2004) are in line with our result as this factor is an important for three parties because it is significant for effectiveness on project performance.

Number of reworks has been ranked by owners, consultants and contractors respondents in the fifth position. This factor has the same rank for three parties because number of reworks affect the relationship between them. This result is in line with Samson and Lema (2002) as number of reworks affects the client satisfaction and overall project performance.

Number of disputes between owner and project parties have been ranked by owners respondents in the second position and have been ranked by consultants and contractors respondents in the fourth position. This factor is more important for

owners because disputes between owner and project parties will affect on relationship between them and the degree of client satisfaction will be affected. All of that affects the performance of project. Samson and Lema (2002) and Iyer and Jha (2005) are in agreement with our result as this factor is high important for owners and contractors because number of disputes affects strongly on client satisfaction and construction performance.

Information coordination between owner and project parties has been ranked by the owners and contractors respondents in the third position and has been ranked by the consultant respondents in the second position. This factor is more important for consultants because in formation coordination affects the client satisfaction. Consultants usually are related to client factors. Samson and Lema (2002) and Cheung et al (2004) are in line with our result as this factor is an important for effectiveness on construction project performance because it affects the client satisfaction.

4.2.6 Group six: Regular and Community Satisfaction factors:

The relative importance index (RII) and rank of regular and community satisfaction factors are summarized in Table 4.21:

Table (4.21) RII and rank of regular and community satisfaction factors

Factors	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
(6) Regular and community satisfaction factors						
Cost of compliance to regulators requirements	0.600	4	0.648	3	0.604	4
Number of non compliance to regulation	0.635	3	0.624	4	0.614	3
Quality and availability of regulator documentation	0.647	2	0.736	1	0.653	2
Neighbors and site conditions problems	0.788	1	0.712	2	0.707	1

Owners view

Neighbors and site conditions problems has been ranked by the owners respondents in the first position with RII equal 0.788. This factor is the most important one for

owners because construction projects in Gaza Strip usually suffer from this problem. This problem affects the time performance of project and causes disputes and delays. Iyer and Jha (2005) are not in agreement with our result as this factor is not important for owners. This might be because of different location, environment and culture.

Quality and availability of regulator documentation has been ranked by the owners respondents in the second position with RII equal 0.647. Quality and availability of regulator documentation affects the regular and community satisfaction. Project performance will also be affected. This result is in line with Samson and Lema (2002) as this factor affects the project performance because it affects the regular and community satisfaction.

Number of non-compliance to regulation has been ranked by the owners respondents in the third position with RII equal 0.635. The more increase of non compliance to regulation, the more dissatisfaction of regular and community for project. This will affect the project performance. This result is in agreement with Samson and Lema (2002) as this factor affects the project performance because it affects the regular and community satisfaction.

Cost of compliance to regulators requirements has been ranked by the owners respondents in the fourth position with RII equal 0.600. Cost of compliance to regulators requirements affects the cost performance of project. Samson and Lema (2002) is in line with our result as this factor affects the regular and community satisfaction.

Consultants view

Quality and availability of regulator documentation has been ranked by the consultants respondents in the first position with RII equal 0.736. This factor is the most important one for consultants as quality and availability of regulator documentation affects the regular and community satisfaction. Project performance will also be affected. This result is in line with Samson and Lema (2002) as this factor

affects the project performance because it affects the regular and community satisfaction.

Neighbors and site conditions problems has been ranked by the consultants respondents in the second position with RII equal 0.712. Construction projects in Gaza Strip usually suffer from this problem. This problem affects the consultant performance of project and causes disputes and delays. Iyer and Jha (2005) are not in line with our result as this factor is not important for client representative. This might be because of different location and culture.

Cost of compliance to regulators requirements has been ranked by the consultants respondents in the third position with RII equal 0.648. Cost of compliance to regulators requirements affects the cost performance of project. Samson and Lema (2002) is in line with our result as this factor affects the regular and community satisfaction.

Number of non-compliance to regulation has been ranked by the consultants respondents in the fourth position with RII equal 0.624. The more increase of non-compliance to regulation, the more dissatisfaction of regular and community for project. This will affect the project performance. This result is in agreement with Samson and Lema (2002) as this factor affects the project performance because it affects the regular and community satisfaction.

Contractors view

Neighbors and site conditions problems has been ranked by the contractors respondents in the first position with RII equal 0.707. Contractors considered this factor as the most important one because construction projects in Gaza Strip usually suffer from this problem. This problem affects the performance of contractors and causes disputes and delay of project. Iyer and Jha (2005) are not in agreement with our result as this factor is not important for contractors. This might be because of different location, environment and culture.

Quality and availability of regulator documentation has been ranked by the contractors respondents in the second position with RII equal 0.653. Quality and availability of regulator documentation affects the regular and community satisfaction. Project performance will also be affected. This result is in line with Samson and Lema (2002) as this factor affects the project performance because it affects the regular and community satisfaction.

Number of non-compliance to regulation has been ranked by the contractors respondents in the third position with RII equal 0.614. The more increase of non-compliance to regulation, the more dissatisfaction of regular and community for project. This will affect the project performance. This result is in agreement with Samson and Lema (2002) as this factor affects the project performance because it affects the regular and community satisfaction.

Cost of compliance to regulators requirements has been ranked by the contractors respondents in the fourth position with RII equal 0.604. Cost of compliance to regulators requirements affects the cost performance of project. Samson and Lema (2002) are in line with our result as this factor affects on regular and community satisfaction and performance of contractors.

Comparison between owners, consultants and contractors:

Comparison between owners, consultants and contractors for regular and community satisfaction factors are summarized in Table 4.22:

Table (4.22) Comparison between owners, consultants and contractors for regular and community satisfaction factors

Factors	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
(6) Regular and community satisfaction factors						
Neighbors and site conditions problems	0.788	1	0.712	2	0.707	1
Quality and availability of regulator documentation	0.647	2	0.736	1	0.653	2

Neighbors and site conditions problems has been ranked by the owners and contractors respondents in the first position and has been ranked by the consultants respondents in the second position. This factor is more important for owners and contractors because it is strongly related to client satisfaction and contractors performance. However, Iyer and Jha (2005) are not in line with our result as this factor is not important for owners and contractors. This might be because of different location, environment and culture.

Quality and availability of regulator documentation has been ranked by the consultants respondents in the first position and has been ranked by the owners and contractors respondents in the second position. Quality and availability of regulator documentation is more important for consultants because if affects the performance of consultants and community satisfaction. This result is in line with Samson and Lema (2002) as this factor affects the contractors' performance because it affects the regular and community satisfaction.

It is obtained that there is a strong agreement between owners and contractors for ranking of all regular and community satisfaction factors because these factors are more related to contractors' performance and client satisfaction. Generally, it can be said that three parties have similar agreement for ranking of these factors.

4.2.7 Group seven: People factors:

The relative importance index (RII) and rank of people factors are summarized in Table 4.23:

Table (4.23) RII and rank of people factors

Factors	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
(7) People factors						
Employee attitudes in project	0.682	4	0.728	2	0.795	3
Recruitment and competence development between employees	0.753	3	0.688	4	0.809	2
Employees motivation	0.765	2	0.696	3	0.791	4
Belonging to work	0.835	1	0.736	1	0.849	1

Owners view

Belonging to work has been ranked by the owners respondents in the first position with RII equal 0.835. This factor is the most important one for owners because belonging to work usually improves productivity and performance of project. Iyer and Jha (2005) are not in line with our result as this factor is moderately important for owners because of different culture and management style.

Employees' motivation has been ranked by the owners respondents in the second position with RII equal 0.765. Employees' motivation leads to belonging to work and productivity will be improved. However, this result is not in agreement with Iyer and Jha (2005) as this factor is moderately important for owners. This might be due to different culture and management style.

Recruitment and competence development between employees has been ranked by the owners respondents in the third position with RII equal 0.753. Recruitment and competence development between employees improve performance of project and the client will be more satisfied. Samson and Lema (2002) are in line with our result as this factor enhance quality and productivity performance of construction projects.

Employee attitudes in project have been ranked by the owners respondents in the fourth position with RII equal 0.682. Employee attitudes affects the project performance and owner satisfaction. This result is in agreement with Iyer and Jha (2005) as this factor is considered as an important for owners because attitudes of employees is related to client satisfaction and project performance.

Consultants view

Belonging to work has been ranked by the consultants respondents in the first position with RII equal 0.736. This factor is the most important one for consultants because belonging to work usually improves consultant's performance. Iyer and Jha (2005) are not in line with our result as this factor is moderately important for client representative because of different culture and management style.

Employee attitudes in project have been ranked by the consultants respondents in the second position with RII equal 0.728. Employee attitudes affects strongly on performance of project. This result is in agreement with Iyer and Jha (2005) as this factor is considered as an important for client representative as attitudes of employees is related to client factors.

Employees' motivation has been ranked by the consultants respondents in the third position with RII equal 0.696. Employees' motivation leads to more belonging to work and performance of project will be improved.

Recruitment and competence development between employees has been ranked by the consultants respondents in the fourth position with RII equal 0.688. Recruitment and competence development between employees improve performance of consultants through projects and the client will be more satisfied. Samson and Lema (2002) are in line with our result as this factor enhances quality and productivity performance of construction projects.

Contractors view

Belonging to work has been ranked by the contractors respondents in the first position with RII equal 0.849. This factor is the most important one for contractors because belonging to work usually improves contractor's productivity and performance of project. Iyer and Jha (2005) are in agreement with our result as this factor is an important for contractors because belonging to works improve productivity and performance of contractors.

Recruitment and competence development between employees has been ranked by the contractors respondents in the second position with RII equal 0.809. Recruitment and competence development between employees improve productivity through project and performance will be enhanced. Samson and Lema (2002) are in line with our result as this factor affects the quality and productivity of construction contractors performance.

Employee attitudes in project have been ranked by the contractors respondents in the third position with RII equal 0.795. Employee attitudes affects the contractors performance through project implementation. This result is in agreement with Iyer and Jha (2005) as this factor is considered as an important for contractors because it affects the performance of contractors.

Employees' motivation has been ranked by the contractors respondents in the fourth position with RII equal 0.791. Employees' motivation leads to belonging to work and will improve productivity, cost and time performance. Iyer and Jha (2005) remarked that this factor is moderately important for contractors because of absence of motivation system in construction projects.

Comparison between owners, consultants and contractors:

Comparison between owners, consultants and contractors for people factors are summarized in Table 4.24:

Table (4.24) Comparison between owners, consultants and contractors for people factors

Factors	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
(7) People factors						
Belonging to work	0.835	1	0.736	1	0.849	1
Employees' motivation	0.765	2	0.696	3	0.791	4

Belonging to work has been ranked by the owners, consultants and contractors respondents in the first position. This factor is the most important one for three parties because belonging to work usually improves productivity and performance of project. Iyer and Jha (2005) are in agreement with our result as this factor is an important for three parties because belonging to works improve productivity and performance of project.

Employees' motivation has been ranked by the owners respondents in the second position. It has been ranked by the consultants respondents in the third position and

has been ranked by the contractors respondents in the fourth position. It is remarked that this factor is less important for contractors because it is rarely contractors motivate employees in Gaza Strip. Iyer and Jha (2005) remarked that this factor is moderately important for contractors because of absence of motivation system in construction projects. However, other factors are obtained that more important for one party than others as shown previously.

4.2.8 Group eight: Health and safety factors:

The relative importance index (RII) and rank of health and safety factors are summarized in Table 4.25:

Table (4.25) RII and rank of health and safety factors

Factors	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
(8) Health and safety factors						
Application of Health and safety factors in organization	0.700	2	0.728	1	0.787	1
Easiness to reach to the site (location of project)	0.694	3	0.704	2	0.774	2
Reportable accidents rate in project	0.729	1	0.680	3	0.600	4
Assurance rate of project	0.671	4	0.632	4	0.635	3

Owners view

Reportable accidents rate in project has been ranked by the owners respondents in the first position with RII equal 0.729. Owners considered this factor as the most important one because reportable accidents rate usually affects the safety performance and the client satisfaction in construction projects. Samson and Lema (2002) are in line with our result as number of all accidents case affects the safety and health performance of construction projects.

Application of health and safety factors in organization has been ranked by the owners respondents in the second position with RII equal 0.700. Application of health and safety factors in construction projects will satisfy the owners. This result is in agreement with Cheung et al (2004) as this factor affects strongly on performance of

projects because it affects the safety system in projects. However, Ugwu and Haupt (2007) are not in line with our result as this factor is moderately important for owners in South Africa. This might be due to different location and culture.

Easiness to reach to the site (location of project) has been ranked by the owners respondents in the third position with RII equal 0.694. Easiness to reach to the site affects the degree of health and safety for project employees.

Assurance rate of project has been ranked by the owners respondents in the fourth position with RII equal 0.671. This factor affects the safety and cost performance of project. DETR (2000) is in line with our result as this factor affects the cost and safety performance of construction projects.

Consultants view

Application of health and safety factors in organization has been ranked by the consultants respondents in the first position with RII equal 0.728. This factor is the most important one for consultants because application of health and safety factors in construction projects will satisfy the owners. This result is in line with Cheung et al (2004) and Ugwu and Haupt (2007) as this factor is significant for consultants because it affects strongly the safety performance in projects.

Easiness to reach to the site (location of project) has been ranked by the consultants respondents in the second position with RII equal 0.704. Easiness to reach to the site affects on the degree of health and safety for project employees.

Reportable accidents rate in project has been ranked by the consultants respondents in the third position with RII equal 0.680. Reportable accidents rate affects the safety performance of construction projects. Samson and Lema (2002) are in agreement with our result as number of all accidents case affects the safety and health performance of construction projects.

Assurance rate of project has been ranked by the consultants respondents in the fourth position with RII equal 0.632. This factor affects the safety and cost performance of

project. This result is in line with DETR (2000) as this factor affects the cost and safety performance of construction projects.

Contractors view

Application of health and safety factors in organization has been ranked by the contractors respondents in the first position with RII equal 0.787. This factor is the most important one for contractors because application of health and safety factors in construction projects will improve construction contractors' performance in project. Cheung et al (2004) and Ugwu and Haupt (2007) are in line with our result as this factor is an important for contractors because it affects strongly on safety performance of projects.

Easiness to reach to the site (location of project) has been ranked by the contractors respondents in the second position with RII equal 0.774. Easiness to reach to the site affects on the degree of health and safety for project employees.

Assurance rate of project has been ranked by the contractors respondents in the third position with RII equal 0.635. This factor affects the safety and cost performance of construction contractors projects. DETR (2000) is in line with our result as this factor affects the cost and safety performance of contractors.

Reportable accidents rate in project has been ranked by the contractors respondents in the fourth position with RII equal 0.600. Reportable accidents rate affects the safety performance of construction projects. This will affect the overall of construction contractors performance. Samson and Lema (2002) are in line with this result as number of all accidents case affects the safety and health performance of construction projects.

Comparison between owners, consultants and contractors:

Comparison between owners, consultants and contractors for health and safety factors are summarized in Table 4.26:

Table (4.26) Comparison between owners, consultants and contractors for health and safety factors

Factors	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
(8) Health and safety factors						
Application of health and safety factors in organization	0.700	2	0.728	1	0.787	1
Reportable accidents rate in project	0.729	1	0.680	3	0.600	4
Easiness to reach to the site (location of project)	0.694	3	0.704	2	0.774	2

Application of health and safety factors in organization has been ranked by the consultants and contractors respondents in first position but has been ranked by the owners respondents in the second position. However, this factor is very important for three parties because application of health and safety factors in construction projects will improve overall performance of construction project. Cheung et al (2004) is in line with this result as this factor affect strongly on performance of projects because it affects the safety of employees.

Reportable accidents rate in project has been ranked by the owners respondents in the first position. It has been ranked by the consultants respondents in the third position and has been ranked by the contractors respondents in the fourth position. Owners considered this factor as the most important one because reportable accidents rate usually affects the safety performance and the client satisfaction degree in construction projects. Samson and Lema (2002) are in agreement with this result as number of all accidents case affects the safety and health performance of construction projects.

Easiness to reach to the site (location of project) has been ranked by the owners respondents in the third position and has been ranked by the consultants and contractors respondent in the second position. This factor is more important for consultants and contractors because easiness to reach to the site is more related to them and affects the degree of safety for their employees.

4.2.9 Group nine: Innovation and learning factors:

The relative importance index (RII) and rank of innovation and learning factors are summarized in Table 4.27:

Table (4.27) RII and rank of innovation and learning factors

Factors	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
(9) Innovation and learning factors						
Learning from own experience and past history	0.847	1	0.752	2	0.818	2
Learning from best practice and experience of others	0.824	3	0.760	1	0.822	1
Training the human resources in the skills demanded by the project	0.835	2	0.720	5	0.787	4
Work group	0.776	5	0.736	4	0.787	4
Review of failures and solve them	0.824	3	0.752	2	0.809	3

Owners view

Learning from own experience and past history has been ranked by the owners respondents in the first position with RII equal 0.847. This factor is the most important one for owners because learning from own experience and past history can improve and develop performance of current and future projects. This result is in line with Samson and Lema (2002) as learning from own experience and past history affects the performance of construction projects because it affects the innovation and learning required to construct projects. This is related to owners' satisfaction.

Training the human resources in the skills demanded by the project has been ranked by the owners respondents in the second position with RII equal 0.835. Training the human resources in the skills demanded by the project assists employees to perform project successfully and with high professional degree. All of that will increase satisfaction of owner. Iyer and Jha (2005) are not in agreement with this result as training the human resources in the skills demanded by the project is not important for owners. This might be due to different location, motivation system and management style.

Learning from best practice and experience of others has been ranked by the owners respondents in the third position with RII equal 0.824. It can improve and develop performance of current and future projects. This result is in agreement with Samson and Lema (2002) as learning from best practice and experience of others affects the performance of construction projects because it affects the innovation and learning required for construction. This is related to clients' satisfaction.

Review of failures and solve them has also been ranked by the owners respondents in the third position with RII equal 0.824. This factor will enhance project performance and will satisfy the owner. Samson and Lema (2002) are in line with this result, as this factor will satisfy the owner of project.

Work group has been ranked by the owners respondents in the fifth position with RII equal 0.776. Work group between owner and other parties lead to better performance of project. This result is in agreement with Samson and Lema (2002) as work group usually satisfy the owners.

Consultants view

Learning from best practice and experience of others has been ranked by the consultants respondents in the first position with RII equal 0.760. This factor is the most important one for consultants because it can improve and develop consultants performance of current and future projects. This result is in agreement with Samson and Lema (2002) as learning from best practice and experience of others affects the performance of consultants as it affects the innovation and learning required for supervision. This is related to clients' satisfaction

Learning from own experience and past history has been ranked by the consultants respondents in the second position with RII equal 0.752. Learning from own experience and past history can improve and develop consultants performance of current and future projects. This result is in line with Samson and Lema (2002) as learning from own experience and past history affects the performance of consultants

because it affects the innovation and learning required for supervision projects. This is related to clients' satisfaction.

Review of failures and solve them has also been ranked by the consultants respondents in the second position with RII equal 0.752. This factor will enhance project performance and will satisfy the owner. Samson and Lema (2002) are in line with this result, as this factor will satisfy the owner of project.

Work group has been ranked by the consultants respondents in the fourth position with RII equal 0.736. Work group between consultant and other parties lead to better performance of project. This result is in agreement with Samson and Lema (2002) as work group usually satisfy the owners.

Training the human resources in the skills demanded by the project has been ranked by the consultants respondents in the fifth position with RII equal 0.720. Consultants should train employees with different and improved skills in order to design and supervise different and complex types of projects.

Contractors view

Learning from best practice and experience of others has been ranked by the contractors respondents in the first position with RII equal 0.822. contractors considered this factor as the most important one because it can improve and develop construction contractors' performance of current and future projects. This factor is strongly related to contractors' party. This result is in line with Samson and Lema (2002) as learning from best practice and experience of others affects the performance of contractors because it affects the innovation and learning required for construction.

Learning from own experience and past history has been ranked by the contractors respondents in the second position with RII equal 0.818. Learning from own experience and past history can improve and develop contractors performance of current and future projects. This factor is also strongly related to contractors' party. This result is in agreement with Samson and Lema (2002) as learning from own

experience and past history affects the performance of contractors because it affects the innovation and learning required to implement projects.

Review of failures and solve them has been ranked by the contractors respondents in the third position with RII equal 0.809. Review of failures and solve them will enhance contractors performance and will satisfy the owner. Samson and Lema (2002) are in line with this result, as this factor will improve the contractors performance and will satisfy the owner of project.

Training the human resources in the skills demanded by the project has been ranked by the contractors respondents in the fourth position with RII equal 0.787. Contractors should train their employees with different and improved skills in order to implement different and complex types of projects. Iyer and Jha (2005) remarked that training the human resources in the skills demanded by the project is not important for contractors because of poor motivation and learning systems in Indian construction projects.

Work group has also been ranked by the contractors respondents in the fourth position with RII equal 0.787. Work group between contractor and other parties lead to better performance of project. This also will satisfy the owner. Samson and Lema (2002) obtained that work group usually enhance performance of contractors and satisfy the owners.

Comparison between owners, consultants and contractors:

Comparison between owners, consultants and contractors for innovation and learning factors are summarized in Table 4.28:

Table (4.28) Comparison between owners, consultants and contractors for innovation and learning factors

Factors	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
(9) Innovation and learning factors						
Learning from own experience and past history	0.847	1	0.752	2	0.818	2
Learning from best practice and experience of others	0.824	3	0.760	1	0.822	1
Training the human resources in the skills demanded by the project	0.835	2	0.720	5	0.787	4

Learning from own experience and past history has been ranked by the owners respondents in the first position and has been ranked by the consultants and contractors respondents in the second position. This factor is more important for owners than for others. Owners can use their own experience and past history to improve and develop performance of their current and future projects. Samson and Lema (2002) remarked that learning from own experience and past history affects the performance of projects because it affects the innovation and learning required to construct projects.

Learning from best practice and experience of others has been ranked by the owners respondents in the third position and has been ranked by the consultants and contractors respondents in the first position. Contractors and consultants considered this factor as more important than owners did. This is because learning from best practice and experience of others can improve and develop consultants and contractors performance. This result is in agreement with Samson and Lema (2002) as learning from best practice and experience of others affects the performance of construction projects because it affects the innovation and learning required for construction.

Training the human resources in the skills demanded by the project has been ranked by the owners respondents in the second position. It has been ranked by the consultants respondents in the fifth position and has been ranked by the contractors respondents in the fourth position. This factor is less important for contractors and consultants in Gaza Strip as they seldom train their employees by required and

professional skills. Iyer and Jha (2005) remarked that training the human resources in the skills demanded by the project is not important for owners and contractors because of poor motivation and learning systems in Indian construction projects.

4.2.10 Group ten: Environment factors:

The relative importance index (RII) and rank of environment factors are summarized in Table 4.29:

Table (4.29) RII and rank of environment factors

Factors	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
(10) Environment factors						
Air quality	0.588	3	0.592	2	0.671	2
Noise level	0.565	4	0.512	4	0.613	4
Wastes around the site	0.635	2	0.584	3	0.649	3
Climate condition in the site	0.729	1	0.656	1	0.707	1

Owners view

Climate condition in the site has been ranked by the owners respondents in the first position with RII equal 0.729. This factor is the most important one for owners because climate condition in the site affects the productivity and time performance of project. This result is not in line with Iyer and Jha (2005) as climate condition is not important for owners because of different location, weather and environment.

Wastes around the site have been ranked by the owners respondents in the second position with RII equal 0.635. Wastes around the site affect the health and safety of employees. This result is in agreement with Cheung et al (2004) as wastes around the site affect strongly the performance of project. However, Ugwu and Haupt (2007) are not in agreement with our result as this factor is not important to owners. This might be because of different location and environment.

Air quality has been ranked by the owners respondents in the third position with RII equal 0.588. Air quality affects the health, safety and productivity performance. Cheung et al (2004) observed that air quality affects strongly the performance of

project. However, Ugwu and Haupt (2007) obtained that this factor is not important to owners. This might be because of different location and environment.

Noise level has been ranked by the owners respondents in the fourth position with RII equal 0.565. Noise level affects the productivity performance of project. Ugwu and Haupt (2007) obtained that this factor is not important for owners. This might be because of different location and environment.

Consultants view

Climate condition in the site has been ranked by the consultants respondents in the first position with RII equal 0.656. Consultants considered this factor as the most important one because climate condition in the site affects the productivity and time performance of project. Iyer and Jha (2005) are not in agreement with our result as climate condition is not important for consultants. This might be due to different location, whether and environment.

Air quality has been ranked by the consultants respondents in the second position with RII equal 0.592. Air quality affects the health, safety and productivity performance. Cheung et al (2004) observed that air quality affects strongly the performance of project. However, Ugwu and Haupt (2007) obtained that this factor is not important to consultants. This might be because of different location and environment.

Wastes around the site have been ranked by the consultants respondents in the third position with RII equal 0.584. Wastes around the site affects the health and safety of employees. Cheung et al (2004) remarked that wastes around the site affect strongly the performance of project. However, Ugwu and Haupt (2007) obtained that this factor is not important to consultants. This might be because of different location and environment.

Noise level has been ranked by the consultants respondents in the fourth position with RII equal 0.512. Noise level affects the productivity performance of project. Ugwu

and Haupt (2007) obtained that this factor is not important for consultants. This might be because of different location and environment.

Contactors view

Climate condition in the site has been ranked by the contractors respondents in the first position with RII equal 0.707. Contractors considered this factor as the most important one because climate condition in the site affects the productivity and time performance of project. This result is not in agreement with Iyer and Jha (2005) as climate condition is not important for contractors. This might be because of different location, weather and environment.

Air quality has been ranked by the contractors respondents in the second position with RII equal 0.671. Air quality affects the health, safety and productivity performance of contractors. Cheung et al (2004) and Ugwu and Haupt (2007) are in line with our result as this factor is very important for contractors because it affects strongly the performance of contractors.

Wastes around the site have been ranked by the contractors respondents in the third position with RII equal 0.649. Wastes around the site affects the health and safety of employees. Cheung et al (2004) observed that wastes around the site affect strongly the performance of project. However, Ugwu and Haupt (2007) obtained that this factor is not important to contractors. This might be because of different location and environment.

Noise level has been ranked by the contractors respondents in the fourth position with RII equal 0.613. Noise level affects the productivity performance of contractors. Ugwu and Haupt (2007) obtained that this factor is moderately important for contractors. This might be because of different location and environment.

Comparison between owners, consultants and contractors:

Comparison between owners, consultants and contractors for environment factors are summarized in Table 4.30:

Table (4.30) Comparison between owners, consultants and contractors for environment factors

Factors	Owner		Consultant		Contractor	
	RII	Rank	RII	Rank	RII	Rank
(10) Environment factors						
Climate condition in the site	0.729	1	0.656	1	0.707	1
Noise level	0.565	4	0.512	4	0.613	4

Climate condition in the site has been ranked by the owners, consultants and contractors respondents in the first position. This factor is the most important one for them because it affects the productivity and time performance of project. This result is not in agreement with Iyer and Jha (2005) as climate condition is not important for three parties. This might be because of different location, weather and environment.

Noise level has been ranked by the owners, consultants and contractors respondents in the fourth position. However, for all parties, noise level is less important than other environmental factors because it is rarely obtained in Gaza Strip. Ugwu and Haupt (2007) remarked that this factor is not important for owners and consultants but it is moderately important for contractors. Generally, noise level affects the productivity performance of construction projects.

4.3 Degree of Agreement among the Owners, Contractors and Consultants Regarding Factors Affecting the Performance of Construction Projects

To determine whether there is a significant degree of agreement among the three groups (Owners, Contractors and Consultants) Kendall's Coefficient of Concordance is used as a measure of agreement among raters. Each case is a judge or rater and each variable is an item or person being judged. For each variable, the sum of ranks is computed. Kendall's W, ranges between zero (no agreement) and one (complete agreement).

To determine whether there is degree of agreement among the levels of each of the factors affecting the performance of construction projects for each owner, contractors and consultants, Kendall's Coefficient of Concordance says that the degree of agreement on a zero to one scale is (Moore et al, 2003; Frimpong et al, 2003):

$$W = \frac{12U - 3m^2 n(n-1)^2}{m^2 n(n-1)} \quad (1)$$

Where:

$$U = \sum_{i=1}^{n} \left(\sum R\right)^2$$

- n = number of factors;
- m = number of groups;
- j = the factors 1,2,…,N.
- Null Hypothesis: H_0 : There is insignificant degree of agreement among the Owners , Contractors and Consultants.
- Alternative Hypothesis: H_1 : There is significant degree of agreement among the Owners , Contractors and Consultants.

Table 4.31 shows the results of Kendall's Coefficient of Concordance for each group:

Table (4.31) Kendall's Coefficient of Concordance

Field	**W**	**Chi-Square**	**P-value**	**Decision**
Cost factors	0.457	119.277	0.012	Reject H0
Time factors	0.527	137.547	0.000	Reject H0
Quality factors	0.586	152.946	0.000	Reject H0
Productivity factors	0.468	122.148	0.008	Reject H0
Client Satisfaction factors	0.537	140.157	0.000	Reject H0
Regular and community satisfaction factors	0.274	71.514	0.885	Don't reject H0
People factors	0.484	126.324	0.004	Reject H0
Health and Safety factors	0.33	86.13	0.506	Don't reject H0
Innovation and learning factors	0.552	144.072	0.000	Reject H0
Environment factors	0.217	56.637	0.995	Don't reject H0
ALL groups	0.507	132.327	0.001	Reject H0

***** The agreement is significant at level of significant α = 0.05

For Cost, Time, Quality, Productivity, Client Satisfaction, People, Innovation and learning factors, and all groups together, the p-values (Sig.) are less than $\alpha = 0.05$ (α is the level of significance) the null hypothesis, H0, is rejected and the alternative hypothesis, H1, is accepted. Therefore, it can be said that there is a significant degree of agreement among the owners, contractors and consultants regarding factors affecting the performance of construction projects in the Gaza strip.

On the other hand, for regular and community satisfaction, Health and Safety, and Environment factors, the p-values (Sig.) are greater than $\alpha = 0.05$ (α is the level of significance) then we don't reject the null hypothesis, H0. Therefore, it can be said that there is insufficient evidence to support the alternative hypothesis, H1. Hence, there is insignificant degree of agreement among the owners, contractors and consultants regarding factors affecting the performance of construction projects in the Gaza strip.

4.4 Means Differences of the Respondents Agreements Regarding the Factors Affecting the Performance of Construction Projects

The Kruskal-Wallis. (KW) test is a statistical test that is used to compare the ranks means between two or more samples. This test is used in order to check out if there are any significant differences in the point of view of the respondents (Owners , Contractors and Consultants) regarding the levels of each of the factors affecting the performance of construction projects. The KW results are shown in the following Table 4.32:

Table (4.32) Kruskal- Wallis test for factors affecting the performance of construction projects

Field	KW value	DF	P-value (Sig.)
Cost factors	2.141	2	0.343
Time factors	0.097	2	0.953
Quality factors	0.004	2	0.998
Productivity factors	0.302	2	0.860
Client Satisfaction factors	2.634	2	0.268
Regular and community satisfaction factors	1.006	2	0.605
People factors	4.456	2	0.108

Field	KW value	DF	P-value (Sig.)
Health and Safety factors	0.080	2	0.961
Innovation and learning factors	1.804	2	0.406
Environment factors	2.949	2	0.229
ALL groups	0.568	2	0.753

DF : Degrees of Freedom

As shown in previous table, all p-value (sig.) for each group is greater than $\alpha = 0.05$ (α is the level of significance), then there are no significant differences between the organization types (Owners , Contractors and Consultants) regarding their respondent degree to all fields.

4.5 Part Three: The Practices Concerning the Performance of Construction Projects:

The target groups in this study are owners, consultants and contractors. 120 questionnaires were distributed as follows: 25 to owners, 35 to consultants and 60 to contractors. 88 questionnaires were received (73%) as follows: 17 (70%) from owners, 25 (72%) from consultants and 46 (77%) from contractors as respondents. This part of study discusses the practices concerning the performance of construction projects.

4.5.1 Time management practice

1. What kind of method do you use to represent the project planning and scheduling?

Table (4.33) Usage of planning method

Item	Percent % (Frequency)		
	Owner	Consultant	Contractor
Bar Chart method	56.25 (10)	41.67 (10)	53.49 (25)
Critical Path method	43.75 (7)	54.17 (14)	32.56 (15)
S-Curve method	-	4.17 (1)	11.63 (5)
Others	-	-	2.33 (1)
Total	100 (17)	100 (25)	100 (46)

Table 4.33 shows that Bar Chart method is the most important planning and scheduling method for owners and contractors because Bar Chart method can

facilitate time performance control for each scheduled activity through project implementation. However, Critical Path Method (CPM) is the most important one for consultants because CPM can be used to determine critical activities of project. This will assist consultants to evaluate overall time performance and to identify the effectiveness of critical path on completion date of project. S-Curve method is never used by owners and it is rarely used by consultants and contractors. This is because S-Curve method can compare only between actual time and estimated time at any stage through project implementation. It is difficult to control time performance for each scheduled activity and it is difficult to obtain critical path affecting overall time performance of project.

Chen (2007) remarked that in many situations, time of projects can be complicated and challenging to be managed. When the activity times in the project are deterministic and known, critical path method (CPM) has been demonstrated to be a useful tool in managing projects in an efficient manner to meet this challenge. Koo et al (2007) stated that construction planners face many scheduling challenges during the course of a project. Planners today rely on CPM-based scheduling tools to evaluate different sequencing alternatives for their feasibility and whether they will meet project deadlines.

2. How often your project team does formally meet for discussion of monitoring, updating and controlling the progress?

Table (4.34) Frequency of meeting type of project team

Item	Percent % (Frequency)		
	Owner	Consultant	Contractor
Daily	11.76 (2)	4.17 (1)	10.87 (5)
Weekly	70.59 (12)	87.50 (22)	80.43 (37)
Monthly	17.65 (3)	4.17 (1)	8.70 (4)
No	-	4.17 (1)	-

Table 4.34 shows that owners, consultants and contractors often meet weekly for discussion. Weekly meeting assist them for monitoring, updating and controlling the progress through project implementation. In addition, they can solve problems, evaluate current performance, and improve future works. Respondents are rarely meets daily or monthly. Daily meeting are required in the case of sensitive and very

important works. Monthly meeting is not effective for monitoring or updating processes. Navon (2005) stated that a controlling and updating is an important element to identify factors affecting construction project performance. Marica (2007) obtained that the controlling and monitoring works affect the quality, production and management system.

3. How often do you coordinate your schedule with master schedule of the project owner?

Table (4.35) Coordination frequency of current schedule with master schedule

Item	Percent % (Frequency)		
	Owner	Consultant	Contractor
Daily	11.76 (2)	4.00 (1)	32.61 (15)
Weekly	47.06 (8)	72.00 (18)	30.43 (14)
Monthly	41.18 (7)	24.00 (6)	36.96 (17)
No	-	-	-

Table 4.35 shows that most of owners and consultants coordinate current schedule with master schedule of the project weekly. This weekly coordination can assist them to evaluate time performance of project comparing with base schedule. However, most of contractors coordinate current schedule with master schedule of the project monthly. In fact, contractors should do that weekly in order to have continuous monitoring, controlling and updating of time performance of project. Generally, monitoring and updating the progress depends up on project duration, type of works and degree of project complexity. Reichelt and Okuwoga (1998) identified that the time performance problem is related to poor time control and updating. Lyneis (1999) obtained that project schedule must be controlled by the dynamic feedback process. Those processes include the rework cycle, feedback loops and effects between work phases.

4. How often do you require the sub-contractors or supplier to submit their detail activities schedule for you in advance to adjust your actual schedule?

Table (4.36) Frequency of coordination with sub-contractors and supplier schedule

Item	Percent % (Frequency)		
	Owner	Consultant	Contractor
Daily	6.25 (1)	12.00 (3)	28.26 (13)
Weekly	43.75 (7)	28.00 (7)	34.78 (16)
Monthly	43.75 (7)	52.00 (13)	32.61 (15)
No	11.76 (2)	8.00 (2)	4.35 (2)

Table 4.36 shows that most owners coordinate with sub-contractors and supplier schedule monthly or weekly. This depends up on the need of coordination and controlling processes. However, most consultants coordinate with sub-contractors and supplier schedule monthly. Most contractors coordinate with sub-contractors and supplier schedule weekly. This coordination depends mainly on project nature, type of work and duration of supplying and implementation. Thomas (2006) remarked that the selection of suitable suppliers for the provision of various construction materials is one of the most important aspects in ensuring success performance of construction projects. Errasti (2007) stated that subcontractors in the construction industry are subject to tremendous pressures in terms of time, service and cost. Subcontractors have responded to these challenges in a number of ways, foremost amongst these has been by working more closely with their suppliers. In the construction industry, subcontractors need to improve their performance in terms of quality, service and cost.

5. How do you supply the incentive system to stimulate the construction time?

Table (4.37) Usage of each incentive system

Item	Percent % (Frequency)		
	Owner	Consultant	Contractor
Increase salary	58.82 (10)	59.09 (15)	52.17 (24)
Bonus in position	-	9.09 (2)	15.22 (7)
Training	26.67 (4)	13.64 (3)	19.57 (9)
Others	20.00 (3)	18.18 (5)	13.04 (6)

Table 4.37 shows that most of owners, consultants and contractors use increase salary system in order to stimulate the construction time. This system will motivate employees and assist them to improve productivity and performance. This system is more important for employees than bonus in position or training systems because these systems are rarely affect on employees performance or their productivity. This is traced to cultural situation in the Gaza Strip. Training is required according to nature of project and its duration. In addition, training is an important for improvement and development overall performance of organization. Chan and Kumaraswamy (2002) proposed specific strategies to increase speed of construction and so to upgrade the construction time performance. It is remarked the better training and motivation system can help to accelerate the performance.

6. Which software do you apply for planning and scheduling the progress the project?

Table (4.38) Usage of each software for planning and scheduling

Item	Percent % (Frequency)		
	Owner	Consultant	Contractor
Primavera	-	12.00 (3)	19.57 (9)
Microsoft project	88.24 (15)	88.00 (22)	50.00 (23)
Excel sheet	11.76 (2)	-	26.09 (12)
Others	-	-	4.35 (2)

Table 4.38 shows that Microsoft project is the most important, famous and easy program used by owners, consultants and contractors for planning and scheduling. This program enables them to schedule, monitor, update and control many criteria of project such as time, cost and resources. In addition, most organizations in the Gaza Strip are familiar with this program to be used for planning and scheduling processes. It is observed that Primavera program is an advanced and a complex program compared with Microsoft project. Construction organizations in the Gaza Strip are not familiar with Primavera to be used or applied. However, Excel program has a limitation in usage for planning and scheduling.

Chan and Kumaraswamy (2002) remarked that construction programs with advanced available software can help to accelerate the performance. Goh (2005) remarked that information technology management leads to performance improvement in the

construction industries. For instance, in Singapore 2003, general administration, design, project management, planning, scheduling, site management were enhanced by using of IT. In addition, there were more advantages as quick working, good quality of work and fast access of information.

7. Did your company formally participate in the pre-project planning effort?

Table (4.39) Company formally participation in the pre-project planning effort

Item	Percent % (Frequency)		
	Owner	Consultant	Contractor
Yes, as the pre-project planner	75.00 (13)	12.00 (3)	23.91(11)
Yes, as the consultant	12.50 (2)	80.00 (20)	8.70 (4)
No	12.50 (2)	8.00 (2)	67.39 (31)

Table 4.39 shows that most owners participate in the pre-project planning effort as the pre-project planner. Most consultants participate in the pre-project planning effort as the consultant. However, Most contractors do not participate in the pre-project planning effort. Planning of construction projects is one of the main duties and responsibilities of consultants. Owners mainly need planning for budget and time estimation of projects. Some contractors participate in the planning for complex and large projects. This depend up on the nature and type of implemented works. Wang (2004) remarked that construction planning and efficient site utilization are of importance in the site management of building construction. Today's complex projects, coupled with an increasing number of project participants, require more effective planning and communication.

8. Did projects be delay because of Gaza strip political conditions?

Table (4.40) Delay of projects because of Gaza strip political conditions

Item	Percent % (Frequency)		
	Owner	Consultant	Contractor
Yes	88.24 (15)	88.00 (22)	76.09 (35)
No	-	-	2.17 (1)
Sometimes	11.76 (2)	12.00 (3)	21.74 (10)

Table 4.40 shows that most owners, consultants and contractors agree that projects were delay because of Gaza strip political conditions. Continuous closures in the Gaza

Strip lead to rapid shortage of construction materials and delay of projects. This problems can be considered as an obstacle for time performance of construction projects. All owners, consultants and contractors feel with such this sensitive problem in their projects. In 2006 there were many projects in Gaza Strip which finished with poor time performance because of many reasons such as non-availability of materials and continuous closures (UNRWA, 2006). Construction projects in Gaza Strip suffered from difficult political and economical situation which lead to poor performance of projects (World Bank, 2004).

4.5.2. Cost management practice:

1. Do you have the cost schedule associated with the estimated time schedule?

Table (4.41) Presence of cost schedule associated with the estimated time schedule

Item	Percent % (Frequency)		
	Owner	Consultant	Contractor
Yes	68.75 (12)	64.00 (16)	58.70 (27)
No	6.25 (1)	4.00 (1)	17.39 (8)
Sometimes	25.00 (4)	32.00 (8)	23.91 (11)

Table 4.41 shows that construction organizations often use cost schedule associated with the estimated time schedule. This association assist organizations to evaluate performance of cost and time together at any stage through project implementation. That will assist construction organizations to know if project is ahead or behind of schedule and if it is over or under estimated cost. Reichelt and Lyneis (1999) obtained that time schedule and budget performance are controlled by the dynamic feedback process. Those processes include the rework cycle, feedback loops creating changes in productivity and quality, and effects between work phases.

2. Do you apply the actual value and earned value concept in controlling cost for the project?

Table (4.42) Applying the actual value and earned value concept in controlling cost

Item	Percent % (Frequency)		
	Owner	Consultant	Contractor
Yes	58.82 (10)	58.33 (15)	54.55 (25)
No	23.53 (4)	12.50 (3)	27.27 (13)
Sometimes	17.65 (3)	29.17 (7)	18.18 (8)

Table 4.42 shows that most of owners, consultants and contractors apply the actual value and earned value concept in controlling cost for the project. Earned value concept provides a system for evaluating the performance of the project through integrating cost, schedule, and work. This will assist for evaluation cost and time performance of projects. For example, at any stage of project, if earned value is more than actual value, the cost performance will be good. Vandevoorde (2006) stated that Earned value project management is a well-known management system that integrates cost, schedule and technical performance. It allows the calculation of cost and schedule variances and performance indices and forecasts of project cost and schedule duration. The earned value method provides early indications of project performance to highlight the need for eventual corrective action.

3. Do you have a cost engineer who is only responsible for dealing with cost control?

Table (4.43) Having a cost engineer who is only responsible for dealing with cost control

Item	Percent % (Frequency)		
	Owner	Consultant	Contractor
Yes	11.76 (2)	28.00 (7)	30.43 (14)
No	76.47 (13)	60.00 (15)	43.48 (20)
Sometimes	11.76 (2)	12.00 (3)	26.09 (12)

Table 4.43 shows that most of owners, consultants and contractors do not have a cost engineer who is only responsible for dealing with cost control. This is because most construction firms in the Gaza Strip are small size nature. Hence, their needs to cost engineer is much lower than large companies. Chan and Kumaraswamy (1996) stated that poor site management and low speed of decision making involving all project teams affecting cost performance control of project. Reichelt and Lyneis (1999)

obtained that project cost performance can be controlled by the dynamic feedback process. Those processes include the rework cycle, feedback loops creating changes in productivity and quality, and effects between work phases.

4. Do you give right and authority for line managers to manage the actual expenses?

Table (4.44) Giving right and authority for line managers to manage the actual expenses

Item	Percent % (Frequency)		
	Owner	Consultant	Contractor
Yes	41.18 (7)	29.17 (7)	43.48 (20)
No	23.53 (4)	41.67 (11)	32.61 (15)
Sometimes	35.29 (6)	29.17 (7)	23.91 (11)

Table 4.44 shows that most owners and contractors give right and authority for line managers to manage the actual expenses. However, most of consultants do not give right and authority for line managers to manage the actual expenses. Giving right and authority for line managers to manage the actual expenses depends mainly on the nature and size of works. Chan and Kumaraswamy (2002) remarked that effective communication and fast information transfer between managers and participants help to accelerate the building construction process and performance.

5. Do you apply any software to plan, monitor, and control cost?

Table (4.45) Applying any software to plan, monitor, and control cost

Item	Percent % (Frequency)		
	Owner	Consultant	Contractor
Yes	47.06 (8)	50.00 (13)	45.65 (21)
No	23.53 (4)	33.33 (8)	28.26 (13)
Sometimes	29.41 (5)	16.67 (4)	26.09 (12)

Table 4.45 shows that most owners, consultants and contractors use software program in order to facilitate planning, monitoring and controlling cost. The most programs used in construction organization in order to control and monitor cost are : Excel, Ms project and Al Aseel programs. Most organizations are familiar with these software programs because they are easy to be used and have different facilities and functions

to control the cost. Goh (2005) remarked that information technology management leads to performance improvement in the construction industries. For instance, in Singapore 2003, general administration, design, project management, cost control, site management were enhanced by using of IT. In addition, there were more advantages as quick working and good quality of work.

6. Do you apply the following records to estimate the construction cost for the project?

Table (4.46) Applying the following records to estimate the construction cost for the project

Item	Percent % (Frequency)		
	Owner	Consultant	Contractor
Historical cost data	45.8 (8)	40.5 (10)	37.1 (17)
Current quotation for labor, material and equipment cost	54.2 (9)	56.8 (14)	59.7 (28)
Others	-	2.7 (1)	3.2 (1)

Table 4.46 shows that most owners, consultants and contractors use current quotation for labor, material and equipment cost to estimate the construction cost for the project. This method is more accurate for cost estimation than others because it depend on current situation. However, historical data is interested to be used for owners, consultants and contractors as an experience can assist for quick evaluation and estimation. Dissanayaka and Kumaraswamy (1999) stated that the current knowledge for construction industry that would influence performance enables project managers to pay special attention to control performance more effectively. Thomas (2002) stated that documenting and archiving performance data could be useful for future reference and projects.

7. Did the project be delay by late payment from the owner?

Table (4.47) Delay of project by late payment from the owner

Item	Percent % (Frequency)		
	Owner	Consultant	Contractor
Yes	35.29 (6)	32.00 (8)	28.26 (13)
No	29.41 (5)	12.00 (3)	15.22 (7)
Sometimes	35.29 (6)	56.00 (14)	56.52 (26)

Table 4.47 shows that most consultants and contractors stated that the project was sometimes delay by late payment from the owner. In the Gaza Strip, contractors usually suffer from this problem. Delay in payment from owner to contractor lead to delay of contractors' performance and cause problem in time performance. This may also lead to disputes and claims between owner and contractor of project. All of that will affect the overall performance of project which has been implemented. Karim and Marosszeky (1999) remarked that average delay in payment from owner to contractor affects the time performance and causes delay of project.

8. Did the actual cost of projects be more than the estimated cost because of Gaza strip political conditions?

Table (4.48) The percent if actual cost of projects was more than the estimated cost because of Gaza strip political conditions

Item	Percent % (Frequency)		
	Owner	Consultant	Contractor
Yes	76.47 (13)	80.00 (20)	82.61 (38)
No	-	4.00 (1)	2.17 (1)
Sometimes	23.53 (4)	16.00 (4)	15.22 (7)

Table 4.48 shows that most owners, consultants and contractors agree that actual cost of projects was more than the estimated cost because of Gaza strip political conditions. Continuous closures in the Gaza Strip lead to rapid shortage of construction materials and escalation of construction material prices. This escalation of material prices affect the liquidity and cost performance of projects. It should be mentioned that construction projects in Gaza Strip suffered from difficult political and economical situation which lead to poor performance of projects (World Bank, 2004). In 2006 there were many projects in Gaza Strip finished with poor performance

because of many reasons such as non-availability of materials and continuous closures (UNRWA, 2006).

4.5.3. Owner satisfaction management practice:

1. Product (project)

Table (4.49) Owner satisfaction degree for consultants and contractors projects

How satisfied are the owners with the finished product of projects executed by your company?	**Percent (%) (Frequency)**		
	Low satisfied	medium satisfied	high satisfied
Consultant	-	20 (5)	80 (20)
Contractor	4.5 (2)	25 (12)	70.5 (32)

Table 4.49 shows that owners are medium satisfied with 20 % of consultants projects and high satisfied with 80 % of consultants projects in the Gaza Strip. However, owners are low satisfied with 4.5 % of contractors projects, medium satisfied with 25% of contractors projects and high satisfied with 70.5 % of contractors projects. Generally, it is obtained that most of consultants and contractors projects are high satisfied by the owners in the Gaza Strip. In addition, some contractors and consultants projects are medium satisfied by the owner because of many reasons such as: poor quality, non conformance to specification, problems in cost and time performance, weak coordination or relationship between projects participants, occurrence of accidents through implementation stage, claims and disputes. Cheung et al (2004) and Iyer and Jha (2005) obtained that speed and reliability of service to owner are important for client satisfaction.

2. Organization

Table (4.50) Owner satisfaction degree for each of consultants and contractors companies' services

How satisfied are the owner with the services of your company?	**Percent (%)**					
	Low satisfied		medium satisfied		high satisfied	
	Consultant	Contractor	Consultant	Contractor	Consultant	Contractor
Overall performance	-	-	20	35.56	80	64.44
Ability to keep to price quoted	-	17.39	48	43.48	52	39.13
Ability to keep to time	8.33	19.57	33.33	30.43	58.33	50.00
Ability to keep to quality	-	2.22	12	20.00	88	77.78
Resolution of any defects	4.00	2.17	28.00	39.13	68.00	58.70
Trust/ Overall confidence in your ability	-	-	24.00	23.91	76.00	76.09

Table 4.50 shows that the overall performance of the most of consultants and contractors projects is high satisfied by the owners as 80 % of consultants projects are high satisfied and 64.44 % of contractors projects are high satisfied by the owners.

On the other hand, most of consultants projects are high satisfied to owners with respect to availability to keep to cost. Most of contractors projects are medium satisfied to owners with respect to availability to keep to cost. Most of consultants and contractors projects are high satisfied to owners with respect to availability to keep to time, availability to keep to quality, resolution of any defects and overall confidence in ability.

Owner satisfaction mainly depends up on information coordination between owner and project parties, leadership skills for project manager, speed and reliability of service to owner, number of disputes between owner and project parties and number of reworks.

3. Defects

Table (4.51) Defects impact degree on the owner at the time of handover

What was the impact of defects on the owner at the time of handover?	few defects with low impact on the owner	Some defects with some impact on the owner	many defects with high impact on the owner
Consultant	87.50 %	12.50 %	-
Contractor	77.27 %	22.73 %	-

Table 4.51 shows that 87.50% of consultants projects and 77.27 % of contractors projects have few defects with low impact on the owner satisfaction. However, 12.50% of consultants projects and 22.73 % of contractors projects have some defects with some impact on the owner satisfaction. Generally, consultants and contractors projects usually have few defects with low impact on the owner satisfaction. This is traced to many factors such as information coordination between owner and project parties, leadership skills for project manager, speed and reliability of service to owner. Cheung et al (2004) and Iyer and Jha (2005) obtained that speed and reliability of service to owner are important for client satisfaction.

4.5.4 Safety management practice:

1. To what extent has an overall project safety factors been implemented?

Table (4.52) Implementation frequency of safety factors

Item	**Percent % (Frequency)**		
	Owner	**Consultant**	**Contractor**
Not at all	6.25 (1)	-	-
Moderately	68.75 (12)	56.00 (14)	52.17 (24)
Extensively	25.00 (4)	44.00 (11)	47.83 (22)

Table 4.52 shows that in most cases, an overall project safety factors has been moderately implemented in construction organizations. This is because of absence of safety control or its application through project implementation stage. In the Gaza Strip, there are many contractors do not care with applying health and safety factors during construction of projects. In addition, consultants do not have sufficient control or continuous supervision for safety application. All of that will lead to occurrence of

accidents and problems in construction projects. Cheung et al (2004) remarked that safety factor affects strongly on performance of projects. Ugwu and Haupt (2007) stated that safety factors are significant for consultants and contractors because it affects strongly the safety performance of construction projects.

2. How often do you organize the meeting for safety issue?

Table (4.53) Meeting frequency for safety issue

Item	Percent % (Frequency)		
	Owner	Consultant	Contractor
None	6.25 (1)	8.00 (2)	26.67 (12)
Monthly	50.00 (9)	64.00 (16)	20.00 (9)
Weekly	25.00 (4)	16.00 (4)	24.44 (11)
Daily	18.75 (3)	12.00 (3)	28.89 (14)

Table 4.53 shows that most of owners and consultants organize the meeting for safety issue monthly. However, most of contractors organize the meeting for safety issue daily. This is because contractors are more interested with operational factors which require frequent and continuous meeting for safety issues. Otherwise contractors, owners and consultants are more familiar with clients and technical factors. Cheung et al (2004) and Ugwu and Haupt (2007) obtained that safety issues are significant and important for improvement of construction projects performance.

3. On average, how much ongoing formal safety training did workers receive each month?

Table (4.54) Safety training numbers each month

Item	Percent % (Frequency)		
	Owner	Consultant	Contractor
None	68.75 (12)	58.33 (15)	41.30 (19)
Less than 1 hr	31.25 (5)	25.00 (6)	52.17 (24)
1 – 4 hrs	-	8.33 (2)	4.35 (2)
4 – 7 hrs	-	4.17 (1)	2.17 (1)
Over 7 hrs	-	4.17 (1)	-

Table 4.54 shows that most of owners and consultants do not have any formal safety training. However, most of contractors have formal safety training less than 1 hr per

month. Generally, in the Gaza Strip, it is observed that most of construction organizations do not have formal safety training. This will lead to absence of safety application and will contribute to occurrence of many accidents and problems in the site. Construction projects in the Gaza Strip are recommended to have formal safety training in order to improve performance of construction projects. Cheung et al (2004) remarked that safety factors affect strongly on performance of construction projects.

4. To what extent was pre-task planning for safety conducted by contractor foremen or other site managers?

Table (4.55) Frequency of pre-task planning for safety conducted by contractor foremen or other site managers

Item	Percent % (Frequency)		
	Owner	Consultant	Contractor
Not at all	11.76 (2)	20.00 (5)	17.78 (8)
Moderately	76.47 (13)	52.00 (13)	53.33 (25)
Extensively	11.76 (2)	28.00 (7)	28.89 (13)

Table 4.55 shows that in most cases, pre-task planning for safety was moderately conducted by contractor foremen or other site managers. This is because of absence of safety planning and control through project implementation stage. In the Gaza Strip, there are many contractors do not care with planning health and safety issues during construction of projects. This will lead to occurrence of accidents and problems in construction projects. Ugwu and Haupt (2007) stated that safety planning is significant for contractors because it affects strongly the safety performance of construction projects.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Construction industry is considered as an important sector in the world as it develops and achieves the goals of society. The performance of the construction industry is affected by clients, contractors, consultants, stakeholders, regulators, national economies and others. The main aim of this thesis is to identify the local factors affecting the performance of construction projects in the Gaza Strip. The aim of this research was broken down into the following objectives:

5.1.1 To determine owners, consultants and contractors perceptions towards the relative importance of the key performance indicators in Gaza Strip construction projects

A structured questionnaire survey approach was considered to study the impact of various attributes and factors affecting construction projects performance. The questionnaire assist to study the attitude of owners, consultants and contractors towards key performance indicators in the construction industry. Pilot study of the questionnaire was achieved by a scouting sample, which consisted of 30 questionnaires. These questionnaires were distributed to expert engineers such as projects managers, site engineers/office engineers and organizations managers. They have a strong practical experience in construction industries field. Their sufficient experiences are a suitable indication for pilot study

Sixty-three factors were considered in this study and were listed under ten groups based on literature review. These groups give a comprehensive summary of the main key performance indicators. The indicators were summarized and collected according to previous studies and others are added as recommended by local experts. The main groups considered in this thesis are time, quality, productivity, client satisfaction,

regular and community satisfaction, people, health and safety, innovation and learning, and environment.

The target groups in this research are owners, consultants and contractors. 120 questionnaires were distributed as follows: 25 to owners, 35 to consultants and 60 to contractors. 88 questionnaires (73%) were received as follows: 17 (70%) from owners, 25 (72%) from consultants and 46 (77%) from contractors as respondents. The respondents are classified as projects managers, site engineers/office engineers and organizations managers, as they have a practical experience in construction industries field. Their sufficient experiences were a suitable indication to find out the perceptive of the relative importance of project performance indicators of the owner, consultant and contractor parties. Their experiences included many construction fields such as buildings, roads and transportations, and water and sewage projects.

The results were analyzed, discussed to obtain the most performance indicators. The relative importance index method (RII) was used here to determine owners, consultants and contractors perceptions of the relative importance of the key performance indicators in Gaza Strip construction projects.

5.1.2 To identify the most significant key performance indicators of construction projects in the Gaza strip

According to owners, consultants and contractors the average delay because of closures and materials shortage was the most important performance factor as it has the first rank among all factors with RII = 0.941 for owners, 0.896 for consultants and 0.943 for contractors. This agreement between all target groups is traced to the difficult political situation from which Gaza strip suffers. Construction projects in Gaza strip is suffering from complex problems because of closures and materials shortage. These problems can be considered as an obstacle for performance of projects.

Availability of resources as planned through project duration has been ranked by the owners respondents in the third position with RII equal 0.871, has been ranked by the consultants respondents in the second position with RII equal 0.858 and has been

ranked by the contractors respondents in the third position with RII equal 0.904. This factor can be considered as an important for three parties and has a similar rank for all parties as it affects directly on project performance such as time. If resources are not available as planned through project duration, the project will suffers from problem of time and cost performance.

The most important factors agreed by the owners, consultants and contractors as the main factors affecting the performance of construction projects in the Gaza Strip were: escalation of material prices; availability of resources as planned through project duration; average delay because of closures and materials shortage; availability of personals with high experience and qualification; quality of equipments and raw materials in project; and leadership skills for project manager. However, there are some factors which can be considered as more important for one party than for others. This is because contractors are interested with operational and managerial factors. However, the owners and consultants considered the client and technical factors to be more important than operational ones.

Quality group has been ranked by the consultants respondents in the first position with RII equal 0.787 because consultants are interested with clients and technical factors. Consultants observed that quality of equipments and raw materials in project and availability of personals with high qualification affect strongly the quality performance of project. People group has been ranked by the contractors respondents in the first position with RII equal 0.812 because contractors observed that competence development between employees and belonging to work affect strongly on productivity, cost and time performance of contractors. Innovation and learning group has been ranked by the owners respondents in the first position with RII equal 0.821 because owners remarked learning from experience and training the human resources with skills demanded by the project affect strongly the project performance.

Cost group has been ranked by the owners respondents in the eighth position with RII equal 0.679, has been ranked by the consultants respondents in the fifth position with RII equal 0.724 and has been ranked by the contractors respondents in the seventh position with RII equal 0.726. This group is more important for consultant than for others because liquidity of organization and project design cost affect the project cost

performance and this is related to owner satisfaction. Time group has been ranked by the owners respondents in the fourth position with RII equal 0.753, has been ranked by the consultants respondents in the third position with RII equal 0.757 and has been ranked by the contractors respondents in the fifth position with RII equal 0.769. This group is also more important for consultant than for others because the consultant is concerned with planned time for project completion.

5.1.3 To evaluate the degree of agreement/disagreement between owners, consultants and contractors regarding the ranking of key performance indicators

Kendall's Coefficient of Concordance is used to determine whether there is degree of agreement among performance factors for owners, consultants and contractors. For Cost, Time, Quality, Productivity, Client Satisfaction, People, Innovation and learning factors, and all groups together, there is a significant degree of agreement among the owners, consultants and contractors. This is because all of owners, consultants and contractors are interested with these groups. On the other hand, for Regular and community satisfaction, Health and Safety, and Environment factors, there is insignificant degree of agreement among the owners, consultants and contractors. This is because contractors are interested with these factors more or less than owners and consultants. This is because contractors are interested with operational and managerial factors. The owners and consultants considered the client and technical factors to be more important than operational ones.

The Kruskal-Wallis. (KW) test is used in order to check out if there are any significant differences in the point of view of the respondents (owners, consultants and contractors) regarding the levels of each of the factors affecting the performance of construction projects. It was found that there are no significant differences between the organization types (owners, consultants and contractors) regarding their respondent degree to all fields.

5.1.4 To formulate recommendations to improve performance of construction projects in the Gaza Strip

The practices concerning with the KPIs such as time, cost, project owner satisfaction and the safety checklists were analyzed in order to know the main practical problems in projects performance in Gaza Strip and then to formulate recommendations to improve performance of construction projects in the Gaza Strip. The following is a summary and conclusion for the main practices concerning with the KPIs in the Gaza Strip.

5.1.4.1 Time management practice:

Bar Chart method is the most important planning and scheduling method for owners and contractors because Bar Chart method can facilitate time performance control for each scheduled activity through project implementation. However, Critical Path Method (CPM) is the most important one for consultants because CPM can be used to determine critical activities of project. This will assist consultants to evaluate overall time performance and to identify the effectiveness of critical path on completion date of project.

Owners, consultants and contractors often meet weekly for discussion. Weekly meeting assist them for monitoring, updating and controlling the progress through project implementation. In addition, they can solve problems, evaluate current performance, and improve future work.

Most of owners, consultants and contractors use increase salary system in order to stimulate the construction time. This system will motivate employees and assist them to improve productivity and performance. This system is more important for employees than bonus in position or training systems because these systems are rarely affect on employees performance or their productivity. This is traced to cultural situation in the Gaza Strip. Training is required according to nature of project and its duration. In addition, training is an important for improvement and development overall performance of organization.

Microsoft project is the most important, famous and easy program used by owners, consultants and contractors for planning and scheduling. This program enables them to schedule, monitor, update and control many criteria of project such as time, cost and resources. In addition, most organizations in the Gaza Strip are familiar with this program to be used for planning and scheduling processes. It is observed that Primavera program is an advanced and a complex program compared with Microsoft project. Construction organizations in the Gaza Strip are not familiar with Primavera to be used or applied. However, Excel program has a limitation in usage for planning and scheduling.

Most owners, consultants and contractors agree that projects were delay because of Gaza strip political conditions. Continuous closures in the Gaza Strip lead to rapid shortage of construction materials and delay of projects. This problems can be considered as an obstacle for time performance of construction projects. All owners, consultants and contractors feel with such this sensitive problem in their projects.

5.1.4.2 Cost management practice:

Most owners and contractors give right and authority for line managers to manage the actual expenses. However, most of consultants do not give right and authority for line managers to manage the actual expenses. However, giving right and authority for line managers to manage the actual expenses depends mainly on the nature and size of works.

Most owners, consultants and contractors use software program in order to facilitate planning, monitoring and controlling cost. The most programs used in construction organization in order to control and monitor cost are : Excel, Ms project and Al Aseel programs. Most organizations are familiar with these software programs because they are easy to be used and have different facilities and functions to control the cost**.**

Most owners, consultants and contractors use current quotation for labor, material and equipment cost to estimate the construction cost for the project. This method is more accurate for cost estimation than others because it depend on current situation.

However, historical data sometimes is interested to be used for owners, consultants and contractors because an experience can assist for quick evaluation and estimation.

Most consultants and contractors stated that the project was sometimes delay by late payment from the owner. In the Gaza Strip, contractors usually suffer from this problem. Delay in payment from owner to contractor lead to delay of contractors' performance and cause problem in time performance. This may also lead to disputes and claims between owner and contractor of project. All of that will affect the overall performance of project which has been implemented.

Most owners, consultants and contractors agree that actual cost of executed projects was more than the estimated cost because of Gaza strip political conditions. Continuous closures in the Gaza Strip lead to rapid shortage of construction materials and escalation of construction material prices. This escalation of material prices affect the liquidity and cost performance of projects.

5.1.4.3 Owner satisfaction management practice:

Generally, it is obtained that most of consultants and contractors projects are high satisfied by the owners in the Gaza Strip. In addition, some contractors and consultants projects are medium satisfied by the owner because of many reasons such as: poor quality, non conformance to specification, problems in cost and time performance, weak coordination or relationship between projects participants, occurrence of accidents through implementation stage, claims and disputes.

In addition, consultants and contractors projects usually have few defects with low impact on the owner satisfaction.

5.1.4.4 Safety management practice:

In most cases, an overall project safety factors has been moderately implemented in construction organizations. This is because of absence of safety control or its application through project implementation stage. In the Gaza Strip, there are many

contractors do not care with applying health and safety factors during construction of projects. In addition, consultants do not have sufficient control or continuous supervision for safety application. All of that will lead to occurrence of accidents and problems in construction projects.

Most of owners and consultants do not have any formal safety training. However, most of contractors have formal safety training less than 1 hr per month. Generally, in the Gaza Strip, it is observed that most of construction organizations do not have formal safety training. This will lead to absence of safety application and will contribute to occurrence of many accidents and problems in the site. Construction projects in the Gaza Strip are recommended to have formal safety training in order to improve performance of construction projects.

5.2 Recommendation

5.2.1 Introduction

Performance problem is costly and often result in disputes, claims and affect the development of the construction industry. The construction organizations must have a clear mission and vision to formulate, implement and evaluate performance. The environment of construction organizations should be proper to implement projects with success performance. It is important for construction organizations to identify the weaknesses of performance in order to solve and overcome. The following issues are recommendations related to obtained results.

5.2.2 Training programs

It is recommended to develop human resources in the construction industry through proper and continuous training programs about construction projects performance. These programs can update their knowledge and can assist them to be more familiar with project management techniques and processes. In addition, it is preferred to develop and improve the managerial skills of engineers in order to improve

performance of construction projects. All of that can be implemented by offering effective and efficient training courses in scheduling, time, cost, quality, safety, productivity, information systems and management of human resources. These courses will lead to success performance through construction projects such as availability of resources as planned through project duration, availability of personals with high experience and qualification, proper quality of equipments and raw materials used in project. In addition, training system will assists for improvement of construction time performance.

5.2.3 Recommendations for construction organizations

It is necessary for construction organizations in Gaza Strip to evaluate both of market share and liquidity before implementation of any construction project because of difficult economic situation in Gaza Strip. That will assist organizations to perform projects successfully and strongly. In addition, it is recommended that a new approach to contract award procedure by giving less weight to prices and more weight to the capabilities and past performance of contractors. It is necessary to establish proper industry regulations and appropriate mechanism for contractors' enforcement. A structured methodology and technique should be identified to overcome the effect of local political and economic situations on the performance of construction projects in the Gaza Strip.

In addition, construction organizations are recommended to evaluate project overtime through project construction in order to enhance and improve time and cost performance of projects. Planned time for project implementation should be more suitable for practice because of difficult political and economic situation in the Gaza Strip. Time needed to implement variation orders and to rectify defects should be estimated and scheduled without affecting project time completion. Having regular meeting among project participants can also enhance performance. Construction organizations should have different incentive systems in order to improve overall performance. In addition, they should have continuous safety training and meeting in order to apply safety factors and achieve better performance.

5.2.4 Recommendations for owners

Owners are recommended to facilitate payment to contractors in order to overcome delay, disputes and claims. All managerial levels should be participated with sensitive and important decision-making. Continuous coordination and relationship between project participants are required through project life cycle in order to solve problems and develop project performance. It is recommended to minimize disputes between owner and project parties. Employees in construction industries should be more interested with belonging to work to productivity and time performance of project.

5.2.5 Recommendations for consultants

Consultants should be more interested with design cost by using multi criteria analysis and choosing the most economic criteria in order to improve their performance and to increase owners satisfaction. In addition, consultants are recommended to facilitate and quicken orders delivered to contractors to obtain better time performance and to minimize disputes and claims.

5.2.6 Recommendations for contractors

Contractors should not increase the number of projects that can not be performed successfully. In addition, contractors should consider political and business environment risk in their cost estimation in order to overcome delay because of closures and materials shortage. There should be adequate contingency allowance in order to cover increase in material cost. A proper motivation and safety systems should be established for improvement productivity performance of construction projects in Gaza Strip. More applications of health and safety factors are necessary to overcome problems of safety performance.

Contractors are recommended to minimize waste rate through project implementation in order to improve cost performance. They should be more interested with conformance to project specification to overcome disputes, time and cost performance problems. Quality materials should be more interested with contractors to improve cost, time and quality performance. This can be done by applying quality trainings

and meetings which are necessary for performance improvement. Contractors are recommended to be more interested with sequencing of work according to schedule. In addition, contractors should have a cost engineer in their projects to control cost successfully.

5.2.7 Recommendations for future research

It is recommended to develop performance measurement framework and modeling system in order to measure performance of construction organizations and projects. In addition, it is recommended to study and evaluate the most important factors as a case study of construction projects in the Gaza Strip.

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Appendix A

Criterion-Related Validity Test

Correlation coefficient of each item of cost factors and the total of this part

No.	Item	Spearman Correlation Coefficient	P-Value (Sig.)
1.	Market share of organization	.364	0.000**
2.	Liquidity of organization	.492	0.000**
3.	Cash flow of project	.470	0.000**
4.	Profit rate of project	.543	0.000**
5.	Overhead percentage of project	.687	0.000**
6.	Project design cost	.563	0.000**
7.	Material and equipment cost	.373	0.000**
8.	Project labor cost	.446	0.000**
9.	Project overtime cost	.639	0.000**
10.	Motivation cost	.696	0.000**
11.	Cost of rework	.689	0.000**
12.	Cost of variation orders	.635	0.000**
13.	Waste rate of materials	.592	0.000**
14.	Regular project budget update	.479	0.000**
15.	Cost control system	.552	0.000**
16.	Escalation of material prices	.440	0.000**
17.	Differentiation of coins prices	.437	0.000**

** Correlation is significant at the 0.01 level

Correlation coefficient of each item of time factors and the total of this part

No.	Item	Spearman Correlation Coefficient	P-Value (Sig.)
1.	Site preparation time	0.562	0.000**
2.	Planned time for project construction	0.539	0.000**
3.	Percentage of orders delivered late	0.616	0.000**
4.	Time needed to implement variation orders	0.706	0.000**
5.	Time needed to rectify defects	0.748	0.000**
6.	Average delay in claim approval	0.701	0.000**
7.	Average delay in payment from owner to contractor	0.577	0.000**
8.	Availability of resources as planned through project duration	0.543	0.000**
9.	Average delay because of closures and materials shortage	0.396	0.000**

** Correlation is significant at the 0.01 level

Correlation coefficient of each item of quality factors and the total of this part

No.	Item	Spearman Correlation Coefficient	P-Value (Sig.)
1.	Conformance to specification	0.755	0.000**
2.	Availability of personals with high experience and qualification	0.795	0.000**
3.	Quality of equipments and raw materials in project	0.775	0.000**
4.	Participation of managerial levels with decision making	0.565	0.000**
5.	Quality assessment system in organization	0.763	0.000**
6.	Quality training/meeting	0.678	0.000**

** Correlation is significant at the 0.01 level

Correlation coefficient of each item of productivity factors and the total of this part

No.	Item	Spearman Correlation Coefficient	P-Value (Sig.)
1.	Project complexity	0.669	0.000**
2.	Number of new projects / year	0.609	0.000**
3.	Management-labor relationship	0.722	0.000**
4.	Absenteeism rate through project	0.778	0.000**
5.	Sequencing of work according to schedule	0.731	0.000**

** Correlation is significant at the 0.01 level

Correlation coefficient of each item of client satisfaction factors and the total of this part

No.	Item	Spearman Correlation Coefficient	P-Value (Sig.)
1.	Information coordination between owner and project parties	0.511	0.000**
2.	Leadership skills for project manager	0.606	0.000**
3.	Speed and reliability of service to owner	0.747	0.000**
4.	Number of disputes between owner and project parties	0.681	0.000**
5.	Number of reworks	0.654	0.000**

** Correlation is significant at the 0.01 level

Correlation coefficient of each item of regular and community satisfaction factors and the total of this part

No.	Item	Spearman Correlation Coefficient	P-Value (Sig.)
1.	Cost of compliance to regulators requirements	0.869	0.000**
2.	Number of non compliance to regulation	0.837	0.000**
3.	Quality and availability of regulator documentation	0.890	0.000**
4.	Neighbors and site conditions problems	0.678	0.000**

** Correlation is significant at the 0.01 level

Correlation coefficient of each item of people factors and the total of this part

No.	Item	Spearman Correlation Coefficient	P-Value (Sig.)
1.	Employee attitudes in project	0.847	0.000**
2.	Recruitment and competence development between employees	0.829	0.000**
3.	Employees motivation	0.872	0.000**
4.	Belonging to work	0.881	0.000**

** Correlation is significant at the 0.01 level

Correlation coefficient of each item of health and safety factors and the total of this part

No.	Item	Spearman Correlation Coefficient	P-Value (Sig.)
1.	Application of Health and safety factors in organization	0.778	0.000**
2.	Easiness to reach to the site (location of project)	0.816	0.000**
3.	Reportable accidents rate in project	0.807	0.000**
4.	Assurance rate of project	0.888	0.000**

** Correlation is significant at the 0.01 level

Correlation coefficient of each item of innovation and learning factors and the total of this part

No.	Item	Spearman Correlation Coefficient	P-Value (Sig.)
1.	Learning from own experience and past history	0.772	0.000**
2.	Learning from best practice and experience of others	0.707	0.000**
3.	Training the human resources in the skills demanded by the project	0.820	0.000**
4.	Work group	0.773	0.000**
5.	Review of failures and solve them	0.837	0.000**

** Correlation is significant at the 0.01 level

Correlation coefficient of each item of environment factors and the total of this part

No.	Item	Spearman Correlation Coefficient	P-Value (Sig.)
1.	Air quality	0.874	0.000**
2.	Noise level	0.810	0.000**
3.	Wastes around the site	0.866	0.000**
4.	Climate condition in the site	0.777	0.000**

** Correlation is significant at the 0.01 level

Appendix B

ISLAMIC UNIVERSITY
ENGINEERING FACULTY
CIVIL ENGINEERING DEPARTMENT

Master Program in Construction Management
(Questionnaire)

Factors Affecting the Performance of Construction Projects in the Gaza Strip

العوامل التي تؤثر على الأداء في المشاريع الإنشائية في قطاع غزة

The aim of this questionnaire is to study the factors affecting the performance of construction projects in the Gaza Strip. This questionnaire is required to be filled with exact relevant facts as mush as possible. All data included in this questionnaire will be used only for academic research and will be strictly confidential. After all questionnaires are collected and analyzed, interested participants of this study will be given feedback on the overall research results.

Submitted by

Saleh Samir Abu Shaban

Supervised by

Prof. Dr. Adnan Enshassi

October, 2007

Part One: General Information: Please add (√) as appropriate:

1. **Type of Organisation:**

○ Owner	○ Consultant	○ Contractor

2. **Typical of projects of organization:**

○ Buildings	○ Roads and transportation
○ Water and sewage	○ Others (specify)……

3. **Company size :(number of employees) :**

Number of employees in your company is ……. employee

4. **Job title of the respondent:**

○ Project Manager/ deputy	○ Site Engineer/ office engineer
○ Organization Manager/ deputy	○ Others (specify) ……

5. **Years of experience of the respondent :**

Number of experience years of the respondent is …….. Year

6. **Number of projects executed in the last five years :**

○ 1 to 10	○ 11 to 20
○ 21 to 30	○ More than 30

7. **Value of executed projects executed in the last five years : (in million dollars)**

○ 1 – less than 2 M	○ 2 – less than 5 M
○ 5 – less than 10 M	○ More than or equal 10 M

Part Two: Factors Affecting the Performance of Construction Projects

Below are numbers of factors affecting the performance of construction projects. From your experience, please express your opinion on the importance of the following factors as key performance indicators of construction projects in the Gaza strip. (Please tick the appropriate box).

Groups/Factors	*Very low important*	*Low important*	*Medium important*	*High important*	*Very high important*
(1) Cost factors					
Market share of organization					
Liquidity of organization					
Cash flow of project					
Profit rate of project					
Overhead percentage of project					
Project design cost					
Material and equipment cost					
Project labor cost					
Project overtime cost					
Motivation cost					
Cost of rework					
Cost of variation orders					
Waste rate of materials					
Regular project budget update					
Cost control system					
Escalation of material prices					
Differentiation of coins prices					
(2) Time factors					
Site preparation time					
Planned time for project construction					
Percentage of orders delivered late					
Time needed to implement variation order**s**					
Time needed to rectify defects					
Average delay in claim approval					
Average delay in payment from owner to contractor					
Availability of resources as planned through project duration					
Average delay because of closures and materials shortage					

Groups/Factors	*Very low important*	*Low important*	*Medium important*	*High important*	*Very high important*
(3) Quality factors					
Conformance to specification					
Availability of personals with high experience and qualification					
Quality of equipments and raw materials in project					
Participation of managerial levels with decision making					
Quality assessment system in organization					
Quality training/meeting					
(4) Productivity factors					
Project complexity					
Number of new projects / year					
Management-labor relationship					
Absenteeism rate through project					
Sequencing of work according to schedule					
(5) Client Satisfaction factors					
Information coordination between owner and project parties					
Leadership skills for project manager					
Speed and reliability of service to owner					
Number of disputes between owner and project parties					
Number of reworks					
(6) Regular and community satisfaction factors					
Cost of compliance to regulators requirements					
Number of non compliance to regulation					
Quality and availability of regulator documentation					
Neighbors and site conditions problems					
(7) People factors					
Employee attitudes in project					
Recruitment and competence development between employees					
Employees motivation					
Belonging to work					
(8) Health and Safety factors					
Application of Health and safety factors in organization					

Groups/Factors	*Very low important*	*Low important*	*Medium important*	*High important*	*Very high important*
Easiness to reach to the site (location of project)					
Reportable accidents rate in project					
Assurance rate of project					
(9) Innovation and learning factors					
Learning from own experience and past history					
Learning from best practice and experience of others					
Training the human resources in the skills demanded by the project					
Work group					
Review of failures and solve them					
(10) Environment factors					
Air quality					
Noise level					
Wastes around the site					
Climate condition in the site					

Part Three: The Practices Concerning with the Factors Affecting the Performance of Construction Projects:

1. The time management practice: Please add (√) as appropriate:

1. What kind of method do you use to represent the project planning and scheduling?

○ Bar Chart method	○ Critical path method	○ S-Curve method	○ Others (.....)

2. How often your project team does formally meets for discussion of monitoring, updating and controlling the progress?

○ Daily	○ Weekly	○ Monthly	○ No

3. How often do you coordinate your schedule with master schedule of the project owner?

○ Daily	○ Weekly	○ Monthly	○ No

4. How often do you require the sub-contractors or supplier to submit their detail activities schedule for you in advance to adjust your actual schedule?

○ Daily	○ Weekly	○ Monthly	○ No

5. How do you supply the incentive system to stimulate the construction time?

○ Increase salary	○ Bonus in position	○ Training	○ Others (……..)

6. Which software do you apply for planning and scheduling the progress the project?

○ Primavera	○ Microsoft project	○ Excel sheet	○ Others (…….)

7. Did your company formally participate in the pre-project planning effort?

○ Yes, as the pre-project planner	○ Yes, as the consultant	○ No

8. Did projects be delay because of Gaza strip political conditions?

○ Yes	○ No	○ Sometimes

2. The cost management practice: Please add (√) as appropriate:

1. Do you have the cost schedule associated with the estimated time schedule?

○ Yes	○ No	○ Sometimes

2. Do you apply the actual value and earned value concept in controlling cost for the project?

○ Yes	○ No	○ Sometimes

3. Do you have a cost engineer who is only responsible for dealing with cost control?

○ Yes	○ No	○ Sometimes

4. Do you give right and authority for line managers to manage the actual expenses?

○ Yes	○ No	○ Sometimes

5. Do you apply any software to plan, monitor, and control cost?

○ Yes	○ No	○ Sometimes

If yes, what is the name of software program? ……

6. Do you apply the following records to estimate the construction cost for the project? (Can be selected more than one option)

○ Historical cost data	○ Current quotation for labor, material and equipment cost	○ Others (……)

7. Did the project delay by late payment from the owner?

○ Yes	○ No	○ Sometimes

8. Did the actual cost of projects be more than the estimated cost because of Gaza strip political conditions?

○ Yes	○ No	○ Sometimes

3. The owner satisfaction management practice : Please add (√) as appropriate:

1. **Product (project)**

How satisfied are the owner with the finished product of projects executed by your company?	Low satisfied	medium satisfied	high satisfied

2. **Organization**

How satisfied are the owner with the services of your company?	Low satisfied	medium satisfied	high satisfied
Overall performance			
Ability to keep to price quoted			
Ability to keep to time	`		
Ability to keep to quality			
Resolution of any defects			
Trust/ Overall confidence in your ability			

3. **Defects**

What was the impact of defects on the owner at the time of handover?		
few defects with low impact on the owner	Some defects with some impact on the owner	many defects with high impact on the owner

4. The safety management practice: Please add (√) as appropriate:

1. To what extent has an overall project safety factors been implemented?

○ Not at all	○ Moderately	○ Extensively

2. How often do you organize the meeting for safety issue?

○ None	○ Monthly	○ Weekly	○ Daily

3. On average, how much ongoing formal safety training did workers receive each month?

○ None	○ Less than 1 hr	○ 1 – 4 hrs	○ 4 – 7 hrs	○ Over 7 hrs

4. To what extent was pre-task planning for safety conducted by contractor foremen or other site managers?

○ Not at all	○ Moderately	○ Extensively

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Factors Affecting the Performance of Construction Projects in the Gaza Strip

العوامل التي تؤثر على الأداء في المشاريع الإنشائية في قطاع غزة

يهدف هذا الاستبيان إلى دراسة العوامل المؤثرة على الأداء في المشاريع الإنشائية في قطاع غزة. لذا يطلب ملئ هذا الاستبيان بالحقائق المناسبة والدقيقة قدر الإمكان. كما أن المعلومات في هذا الاستبيان سوف تستخدم فقط بغرض البحث العلمي وسوف يتم المحافظة على سريتها. سوف يتم إحاطة جميع المهتمين المشاركين في هذا الاستبيان بالنتائج المستخلصة بعد إنهاء الدراسة.

Submitted by

Saleh Samir Abu Shaban

Supervised by

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October, 2007

الجزء الأول: معلومات عامة: يرجى اختيار الإجابة التي ترونها مناسبة بوضع علامة (√) :

1. نوع المؤسسة:

○ مالك	○ استشاري	○ مقاول

2. مجالات عمل المؤسسة:

○ مباني	○ طرق ومواصلات
○ مياه ومجاري	○ غير ذلك (وضح) .....

3. حجم المؤسسة (عدد الموظفين):

عدد الموظفين في مؤسستكم هو ..... موظف

4.المركز الوظيفي لمن يقوم بتعبئة الاستبيان

○ مدير مشروع / نائب مدير مشروع	○ مهندس موقع / مهندس مكتب
○ مدير المؤسسة / نائب مدير المؤسسة	○ غير ذلك (وضح) .....

5.سنوات الخبرة لمن يقوم بتعبئة الاستبيان

عدد سنوات الخبرة لمن يقوم بتعبئة الاستبيان هو ..... سنة

6.عدد المشاريع التي نفذت خلال الخمس أعوام الماضية

○ 1 – 10 مشروع	○ 11 – 20 مشروع
○ 21 – 30 مشروع	○ أكثر من 30 مشروع

7.قيمة المشاريع التي نفذت خلال الخمس أعوام الماضية

○ 1 – أقل من 2 مليون دولار	○ 2 – أقل من 5 مليون دولار
○ 5 – أقل من 10 مليون دولار	○ 10 مليون دولار فأكثر

الجزء الثاني: العوامل المؤثرة على الأداء في المشاريع الإنشائية

فيما يلي مجموعة من العوامل المؤثرة على الأداء في المشاريع الإنشائية. من خلال خبرتكم العملية، يرجى إفادتنا برأيكم حول مدى أهمية تأثير كل عامل على الأداء في المشاريع الإنشائية في قطاع غزة. يرجى اختيار الإجابة التي ترونها مناسبة بوضع علامة (√) وذلك في الجدول الموضح أدناه.

العوامل المؤثرة على الأداء في المشاريع الإنشائية	مهم بدرجة قليلة جدا	مهم بدرجة قليلة	مهم بدرجة متوسطة	مهم بدرجة كبيرة	مهم بدرجة كبيرة جداً
(1) العوامل المتعلقة بالتكلفة					
حجم المشاركة المالية في السوق للمؤسسة					
السيولة النقدية للمؤسسة					
التدفق المالي للمشروع					
نسبة الأرباح من المشروع					
المصاريف الإدارية للمشروع					
تكلفة التصميم للمشروع					
تكلفة المواد والمعدات للمشروع					
تكلفة العمالة في المشروع					
تكلفة ساعات العمل الإضافية للمشروع					
تكلفة الحوافز المادية					
تكلفة إعادة تنفيذ بعض الأعمال					
تكلفة الأوامر التغييرية					
نسبة الفاقد في المواد					
تحديث ميزانية المشروع بانتظام					
نظام مراقبة التكاليف					
ارتفاع أسعار المواد					
التغير في أسعار العملات					
(2) العوامل المتعلقة بالوقت					
الوقت اللازم لتجهيز الموقع					
المدة المقترحة لإنشاء المشروع					
نسبة التأخر في الموافقة على أوامر العمل					
المدة اللازمة لتنفيذ الأوامر التغييرية					
المدة اللازمة لإصلاح أو تعديل الأخطاء والعيوب					
معدل التأخير في الموافقة على المطالبات					
معدل التأخير في الدفعات المالية من المالك للمقاول					
توفر الموارد كما هو مخطط له وحسب مدة المشروع					
معدل التأخير بسبب إغلاق المعابر وقلة المواد					
(3) العوامل المتعلقة بالجودة					
مدى الالتزام بالمواصفات والشروط المتفق عليها					
وجود الأشخاص ذوي الكفاءة والخبرة العالية					

العوامل المؤثرة على الأداء في المشاريع الإنشائية	مهم بدرجة قليلة جدا	مهم بدرجة قليلة	مهم بدرجة متوسطة	مهم بدرجة كبيرة	مهم بدرجة كبيرة جداً
جودة المواد الخام و المعدات المستخدمة في المشروع					
مشاركة المستويات الإدارية للشركة في اتخاذ القرارات					
وجود نظام لتقييم الجودة في المؤسسة					
وجود اجتماعات ودورات تدريبية متعلقة بالجودة					
(4) العوامل المتعلقة الإنتاجية					
مدى التعقيد الموجود في المشروع					
عدد المشاريع الجديدة في السنة					
العلاقة بين العمال وإدارة المشروع					
معدل غياب العاملين في المشروع					
تتابع أنشطة المشروع حسب الجدول الزمني					
(5) العوامل المتعلقة بإرضاء المالك					
التنسيق في تبادل المعلومات بين المالك و طاقم المشروع					
المهارات القيادية لمدير المشروع					
السرعة والكفاءة في تقديم الخدمة للمالك					
عدد الخلافات والنزاعات بين المالك و طاقم المشروع					
عدد الأعمال المطلوب إعادتها					
(6) العوامل المتعلقة بإرضاء الأنظمة والمجتمع					
التكلفة اللازمة للالتزام بالأنظمة					
عدد الأعمال المخالفة للأنظمة					
جودة وتوفر الأوراق والمستندات الرسمية و النظامية					
المشاكل الناتجة عن الجيران والظروف المحيطة بالموقع					
(7) العوامل المتعلقة بالأفراد					
سلوك الموظفين في المشروع					
تعزيز روح المنافسة بين الموظفين					
تحفيز الموظفين					
الانتماء للعمل (شعور الموظف بالعدل)					
(8) العوامل المتعلقة بالسلامة والأمان					
مدى تطبيق عوامل الأمن والسلامة في المشروع					
سهولة الوصول إلى الموقع (مكان المشروع وموقعه)					
نسبة الحوادث المسجلة في المشروع					
نسبة التعويضات الناتجة عن الحوادث للعاملين وغيرهم					
(9) العوامل المتعلقة بالتجديد والتعليم والتدريب (التطوير)					
التعلم من الخبرة الذاتية ومن الخبرة السابقة					
التعلم من الأداء الأفضل والخبرات لدى الآخرين					
تدريب الموارد البشرية بالمهارات الجديدة واللازمة للمشروع					
العمل الجماعي					
مراجعة الأخطاء والمشاكل ووضع الحلول المناسبة لها					

العوامل المؤثرة على الأداء في المشاريع الإنشائية	مهم بدرجة قليلة جدا	مهم بدرجة قليلة	مهم بدرجة متوسطة	مهم بدرجة كبيرة	مهم بدرجة كبيرة جداً
(10) العوامل المتعلقة بالبيئة					
جودة الهواء					
مستوى الضجيج					
النفايات الموجودة حول الموقع					
الظروف المناخية في الموقع					

الجزء الثالث: التطبيقات المتعلقة بالعوامل المؤثرة على الأداء في المشاريع الإنشائية

1. العوامل المتعلقة بالوقت: يرجى اختيار الإجابة التي ترونها مناسبة بوضع علامة (√) :

1. أي نوع من الطرق التالية تستخدم في جدولة وتخطيط المشاريع؟

○ مخطط المستقيمات (Bar Chart)	○ طريقة المسار الحرج (Critical Path Method)	○ طريقة منحنى S (S Curve Method)	○ طرق أخرى (وضح .....)

2.كيف تحدث الاجتماعات الدورية لإدارة المشروع لمناقشة ومتابعة أنشطة المشروع المختلفة؟

○ يوميا	○ أسبوعيا	○ شهريا	○ لا تحدث اجتماعات

3.كيف تنسق وتتابع بين جدولك الزمني والجدول الأساسي المعمول به من قبل المالك؟

○ يوميا	○ أسبوعيا	○ شهريا	○ لا يوجد تنسيق

4.كيف تحتاج عادة إلى جدولة تنفيذ الأعمال من قبل مقاول الباطن أو جدولة توريد المواد من قبل المورد وذلك لتعديل الجدول الزمني الحقيقي الخاص بك؟

○ يوميا	○ أسبوعيا	○ شهريا	○ لا تحتاج

5.كيف تستخدم نظام التحفيز لتحافظ على مدة المشروع الزمنية؟

○ زيادة الراتب	○ علاوة في المنصب	○ التدريب	○ أمور أخرى (وضح.....)

6.أي البرامج التالية تستخدم لتخطيط وجدولة المشروع؟

○ Primavera	○ Microsoft project	○ Excel sheet	○ برامج أخرى (وضح.....)

7.هل شركتكم تشارك في التخطيط المسبق للمشروع؟

○ نعم، كمخطط للمشروع	○ نعم، كاستشاري	○ لا تشارك الشركة في التخطيط المسبق للمشروع

8.هل يتأخر المشروع بسبب الظروف التي يمر بها القطاع من وقت لآخر؟

○ نعم	○ لا	○ أحيانا

2.العوامل المتعلقة بالتكلفة: يرجى اختيار الإجابة التي ترونها مناسبة بوضع علامة (√) :

1. هل لديك جدولة خاصة بتكاليف المشروع بشكل مرتبط مع الجدولة الزمنية؟

○ نعم	○ لا	○ أحيانا

2. هل تطبق مبدأ التكلفة الفعلية والقيمة المكتسبة (المستحقة) في التحكم بتكلفة المشروع؟

○ نعم	○ لا	○ أحيانا

3. هل لديكم مهندس تكاليف للتحكم بتكاليف المشروع؟

○ نعم	○ لا	○ أحيانا

4. هل يتم إعطاء الصلاحية من قبل المدراء للأفراد لإدارة النفقات الحقيقة للمشروع؟

○ نعم	○ لا	○ أحيانا

5. هل تطبق أو تستخدم أي برنامج كمبيوتر للتخطيط أو التحكم أو مراقبة التكاليف؟

○ نعم	○ لا	○ أحيانا

إذا كانت الإجابة نعم، من فضلك حدد اسم البرنامج؟ .....

6. هل تستخدم الوسائل التالية لتقدير تكلفة المشروع؟ (يمكن اختيار أكثر من اختيار)

○ المعلومات من الخبرة السابقة	○ من خلال أسعار العمالة، المواد، المعدات والتجهيزات في الوقت الحالي	○ أمور أخرى (وضح.....)

7. هل يتأخر المشروع بسبب تأخر الدفعات من قبل المالك؟

○ نعم	○ لا	○ أحيانا

8.هل تزيد تكلفة المشروع الحقيقية عن التكلفة التقديرية بسبب الظروف التي يمر بها القطاع من وقت لآخر؟

○ نعم	○ لا	○ أحيانا

3. العوامل المتعلقة بإرضاء المالك: من فضلك ضع علامة (√) في المكان المناسب في الجداول الموضحة أدناه.

1. الناتج (المشروع)

كيف يكون رضا المالك بالنسبة للناتج النهائي للمشاريع التي قمتم بتنفيذها؟	مرضي بشكل قليل	مرضي بشكل متوسط	مرضي بشكل كبير

2. الشركة/ المؤسسة

كيف يكون رضا المالك بالنسبة لعمل شركتكم للبنود التالية؟	مرضي بشكل قليل	مرضي بشكل متوسط	مرضي بشكل كبير
الأداء الكلي			
القدرة على المحافظة على تكلفة المشروع			
القدرة على المحافظة على وقت المشروع			
القدرة على المحافظة على جودة المشروع			
حل أي مشكلة أو خطأ في المشروع			
الثقة الكاملة بقدرات الشركة/المؤسسة			

3. العيوب

ما هو مدى تأثير العيوب على المالك في مرحلة تسليم المشروع؟		
هناك عيوب قليلة وتأثيرها بسيط على المالك	العيوب متوسطة وتأثيرها متوسط على المالك	العيوب كثيرة وتأثيرها كبير على المالك

4. العوامل المتعلقة بعوامل السلامة والأمان: يرجى اختيار الإجابة التي ترونها مناسبة بوضع علامة (√) :

1. إلى أي مدى تتم عملية تطبيق عوامل الأمن والسلامة للمشروع ؟

○ لا يوجد تطبيق	○ بشكل متوسط	○ بشكل كبير

2. كيف تنسق عادة لاجتماعات بخصوص عوامل الأمن والسلامة في المشروع؟

○ لا يوجد تنسيق	○ بشكل شهري	○ بشكل أسبوعي	○ بشكل يومي

3. كمتوسط، كم عدد الساعات التدريبية الرسمية الخاصة بعوامل السلامة والتي يتلقاها العمال أسبوعيا؟

○ لا يوجد تدريب	○ أقل من ساعة	○ من ساعة إلى أربع ساعات	○ من أربع ساعات إلى سبع ساعات	○ أكثر من سبع ساعات

4.لأي مدى تتم عملية التخطيط المسبق لعوامل الأمن و السلامة في المشروع من قبل مديري المشروع أو المقاول؟

○ لا يوجد	○ بشكل متوسط	○ بشكل كبير