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" العوامل التي تؤثر على إدارة استدراج العروض في صناعة التشييد في قطاع غزة "

Factors Affecting the Selection of Procurement System in the Construction Industry in Gaza Strip

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إقـــــرار

أنا الموقع أدناه مقدم الرسالة التي تحمل العنوان:

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نتيجة الحكم على أطروحة ماجستير

بناءً على موافقة شئون البحث العلمي والدراسات العليا بالجامعة الإسلامية بغزة على تشكيل لجنة الحكم على أطروحة الباحث/ **قصي عبدالحكيم موسى الغفري** لنيل درجة الماجستير في **كلية *الهندسة*** قسم **الهندسة المدنية- إدارة المشروعات الهندسية** وموضوعها:

العوامل التي تؤثر على نظام استدراج العروض في صناعة التشييد في قطاع غزة

Factors Affecting the Selection of Procurement System in the Construction Industry in Gaza Strip

وبعد المناقشة التي تمت اليوم الأربعاء 06 صفر 1437هـ، الموافق2015/11/18م الساعة الواحدة ظهراً، اجتمعت لجنة الحكم على الأطروحة والمكونة من:

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وبعد المداولة أوصت اللجنة بمنح الباحث درجة الماجستير في **كلية *الهندسة*/ قسم الهندسة المدنية- إدارة المشروعات الهندسية.**

واللجنة إذ تمنحه هذه الدرجة فإنها توصيه بتقوى الله ولزوم طاعته وأن يسخر علمه في خدمة دينه ووطنه.

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{نَرْفَعُ دَرَجَاتٍ مَّن نَّشَاءُ ۗ وَفَوْقَ كُلِّ ذِي عِلْمٍ عَلِيمٌ}

سورة يوسف : 76

"All things are difficult before they are easy"

Thomas Fuller (1608 -1661)

Dedication

- Firstly, this research is lovingly dedicated to my beloved **Father** and my beloved **Mother** whose words of support and push for tenacity ring in my ears.
- And without doubt, I dedicate this thesis to my beloved **wife** for here generous encouragement that I will never forget.
- A special feeling to my daughters **Naya** and **Lelya** who were missing my direct care during my study.
- To all my **brothers, sisters, colleagues** and **friends** for their endless support.

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- All glory and thanks goes to Almighty, **Allah** who bestowed me the awareness, perseverance, mercy and help to make this accomplishment possible.
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Thank you,
Qosai A. El-Ghefari

Abstract

Purpose: Procurement system has recently attained widespread attention in the Construction Industry (CI). Where procurement system has been suggested by several professionals and researchers as the universal remedy to addressing the inefficiencies in the CI. In numerous cases in different countries, potential benefits and competitive advantages have been reported. However, in spite of the benefits and potentials of procurement system technologies, it is not applied in the CI in Gaza strip just like many other regions over the world. Therefore, the purpose of this research was to develop a clear understanding about procurement system by identifying the different factors that will facilitate and those that will impede the prospects of successful adoption of procurement system in the CI firms.

Design/methodology/approach: A quantitative survey was used in this research. Three main steps were used to reach to the final version of the questionnaire: *Face validity* by presenting the questionnaire to 6 experts in the AEC field as well as experts in statistics, *Pre-testing the questionnaire* in two phases with 6 people who represented the target group, which involved professionals. *Pilot study* was conducted by distributing 30 copies of the questionnaire to respondents from the targeted group and analyzing them for testing statistical validity and reliability. After piloting, the questionnaire was adopted and distributed to the whole sample from the targeted group. 102 copies of the questionnaire were distributed and 92 copies of the questionnaire were received from the respondents with a response rate = 90.2 %. To draw meaningful results, the collected data have been analyzed by using the quantitative data analysis techniques (which include Relative important index, Pearson correlation analysis, and others) through the Statistical Package for Social Science (SPSS) IBM version 22.

Findings: The study results indicated that the awareness level of procurement system by professionals in the CI in Gaza strip is very low. Findings indicated that procurement systems are significantly needed and important, like procurement management systems benefits are significantly valuable for professionals in the CI in Gaza strip. On the other hand, the research findings demonstrated that procurement system barriers were greatly affecting the adoption of procurement management in the CI in Gaza strip. The major procurement system factor was the availability of the materials. The results showed that the top five significant factors that had most influence on the applying of procurement methods in the Gaza Strip in construction projects are: availability of the materials, contractor reputation, delays in the project financing, political considerations and predicting the actual project tasks time. This research concludes that there is no serious interest on procurement management practice in Gaza strip.

Research limitations: The findings are confined only to the CI in Gaza strip and the development of the research is based only on the quantitative method through questionnaire

survey. Also, the previous studies related to procurement management in Gaza strip is not widespread.

Practical implications: Procurement system awareness and interest need to be increased through comprehensive education and training programs. Awareness of construction firms about procurement systems should be enhanced by increasing the role of academic institutions and universities. Cooperation between construction firms and consultants/ construction managers during the procurement phase should be developed to minimize problems and enhance knowledge.

Keywords: Construction Industry (CI), Procurement Systems, Procurement Management, Gaza Strip, Palestine.

ملخص البحث

الغرض: اكتسب نظام استدراج العروض (PM) في صناعة التشييد اهتماماً واسع النطاق من قبل العديد من المهنيين والباحثين في صناعة الانشاءات (CI). حيث تم اقتراح ضرورة الاهتمام في نظام استدراج العروض لعلاج أوجه القصور في صناعة الإنشاءات (CI). حيث انه في العديد من الحالات المختلفة تم الانتباه الى اهمية وفوائد ومميزات الاهتمام في نظام استدراج العروض. على الرغم من هذه الاهمية لنظام استدراج العروض إلا ان تطبيقه في قطاع الانشاءات لا يتم بشكل متكامل كما يتم في الدول المتقدمة.
وبناء على ذلك، كان الغرض من هذا البحث هو تطوير فهم واضح لنظام استدراج العروض في المشاريع الانشائية عن طريق دراسة العوامل التي من شأنها تسهيل تطبيق هذه الادارة في شركات ومؤسسات البناء.

منهجية البحث: تم اختيار البحث الكمي وذلك باستخدام الاستبانة التي تم تصميمها بالاستناد على الدراسات السابقة. وقد تم استخدام ثلاث خطوات رئيسية للوصول الى الشكل الاخير من الاستبانة، والتي كانت كالتالي: اختبار الصلاحية من خلال تقديم الاستبانة الى 6 خبراء في مجال صناعة الانشاءات بالإضافة الى خبراء في مجال الاحصاء. وقد تم اختبار الاستبانة على مرحلتين مع 6 من ذوي العلاقة ممن يمثلون الفئة المستهدفة في هذا البحث، وقد اجريت دراسة تجريبية عن طريق توزيع وتحليل 30 نسخة من الاستبانة للفئة المستهدفة لإجراء اختبار الصلاحية الاحصائي بالإضافة الى اختبار الثبات. وبعد نجاح الدراسة التجريبية، تم اعتماد الاستبانة وتوزيعها على كامل العينة من الفئة المستهدفة. حيث تم توزيع عدد 102 استبانة في حين تم جمع عدد 92 استبانة لتكون بذلك نسبة الاستجابة = 90.2% . وبعد ذلك تم تحليل البيانات كمياً لاستنباط نتائج ذات مغزى باستخدام برنامج SPSS (اصدار IBM 22).

النتائج: أشارت نتائج الدراسة أن مستوى اهتمام المختصين بنظام استدراج العروض في صناعة الانشاءات منخفض في قطاع غزة، في حين اظهرت الدراسة مدى الحاجة والأهمية لتطبيق إدارة استدراج العروض في صناعة الانشاءات. من ناحية أخرى أظهرت نتائج الدراسة وجود عراقيل بشكل كبير في تطبيق نظام استدراج العروض من قبل الجهات المختصة. وأوضحت الدراسة أن أكثر خمس عوامل تؤثر على تطبيق نظام استدراج العروض هي: توفر المواد الاساسية في صناعة الإنشاءات وسمعة المقاول، والتأخير في تمويل المشروع والمؤثرات السياسية، والزمن الفعلي لتنفيذ بنود المشروع. في حين انه كان من الواضح عدم وجود جدّية من قبل صناع القرار في تطبيق نظام استدراج العروض في المشاريع الانشائية في قطاع غزة.

قيود البحث: اقتصرت نتائج هذا البحث فقط على صناعة الانشاءات في قطاع غزة، كما أن العينة شملت المهندسين المدنيين المسجلين في نقابة المهندسين في قطاع غزة والذين يعملون في مجالات

التصميم والإشراف ومهندسي المكاتب ومدراء المشاريع وفي مجالات أخرى مختلفة، وقد اعتمد هذا البحث على الطريقة الكمية من خلال الاستبانة.

الاثار العملية: نتائج هذا البحث تبين ان هناك ضرورة ملحة لزيادة الاهتمام بموضوع نظام استدراج العروض من خلال برامج شمولية للتعليم والتدريب بالإضافة الى ذلك يجب على الهيئات المختلفة بشكل عام ونقابة المهندسين والمراكز المتخصصة كالجامعات بشكل عام أن تقوم بدورها في ابراز اهمية ادارة استدراج العروض في المشاريع الإنشائية، كما يجب أن يتم التعاون بين شركات المقاولات والاستشاريين/ مدراء الانشاء خلال مرحلة استدراج العروض لتعزيز المعرفة وتقليل الأخطاء خلال هذه المرحلة.

الكلمات المفتاحية: نظام استدراج العروض، ادارة استدراج العروض، قطاع غزة، فلسطين.

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List of abbreviations

Abbreviation	The interpretation of Abbreviation
CI	Construction Industry
SPSS	Statistical Package for the Social Sciences
Cα	Cronbach's Coefficient Alpha
RII	Relative Importance Index
PCA	Principal Component Analysis
R	Pearson product-moment correlation coefficient, or "Pearson's correlation coefficient"
N	Sample Size
DF	Degree of Freedom

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Chapter 1

Chapter 1: Introduction

1.1 Background

The procurement system is a key means through which the client creates pre-conditions for successful achievement of program specific objectives. The use and development of procurement system in any construction industry are affected by various factors (Rameezdeen and Desilva, 2002). Procurement is crucial since it sets the basis for cooperation between clients and contractors. This is true whether the project is local, regional or global in scope. Traditionally, procurement procedures are competitive, resulting in conflicts, adversarial relationships and less desirable project results (Pesamaa, et al., 2009).

Strategies for the procurement of building projects have not changed significantly in the last 25 years, though time and cost overruns are still prevalent throughout the industry (Smith and Love, 2001). In a response to reduce the incidence of time and costs overruns, the disputes that may often arise, and the likelihood of project success, alternative forms of procurement method such as partnering and alliancing have been advocated (Love, et al., 1998). Not all forms of procurement method, however, are appropriate for particular project types, as client objectives and priorities invariably differ (Skitmore and Masden, 1988); (Love, et al., 1996). The objectives and priorities of a client need to be matched to a procurement system. To do this effectively, it is essential that the characteristics of various procurement systems and selection methods available are understood by clients and their divisors before a procurement method is selected (Davis, et al., 2008).

For any given project, a client can adopt a collaborative strategy, such as collaborating irrespective of the procurement method used. Such a strategy has been often used by clients who have series of projects to undertake. The performance of both contractors and consultants can be monitored using pre-defined indicators for each of the projects they are involved with and then compared. This approach is particularly useful to monitor and evaluate disbursement of incentives where appropriate (Mortledge, et al., 2006). Once the primary strategy for a project has been established, different factors should be considered when evaluating the most appropriate procurement strategy (Rowlinson, 1999; Mortledge, et al., 2006).

Quit many previous studies have identified number of factors influencing the selection of the most suitable procurement system. The factors took into account when selecting the procurement method will influence the procurement system throughout the project. Depending on the client's needs, which vary widely due to the nature of the projects, the procurement method could be established. However, there is no universal procurement method, which would be suitable for all kinds of construction projects (Luu, et al., 2003(a)).

Selection of an absolute optimal procurement method is difficult, because even the most experienced client or contractor does not know all the potential benefits or risks for each method. Procurement is, therefore, a succession of 'calculated risks'. Industry and academia have consistently focused on reducing this risk using innovative methods of procurement. The difficulty, and what sets construction industry procurement far apart from anything else, is the complexity of projects. Influences such as ground conditions, topography, logistics, weather, available technologies, finance, labor availability and services, just to name a few, all affect the ability of a project to be completed on time, on budget and to a high quality (The Chartered Institute of Building (CIOB), 2010).

1.2 Importance of the research

The research importance comes from the following points:

- Selecting an appropriate procurement method will affect the project positively, and vice versa.
- Exploring more procurement methods aside from the traditional procurement method, by pointing out the advantages of those methods regarding the time and costs.
- Local practice in Gaza Strip is very poor when considering procurement methods of materials and equipment.
- Enhance the knowledge of suitable procurement method selection, by pointing out the advantages and disadvantages of different and well-known procurement strategies with respect to the speed, budget and other factors. Hence, eliminating/minimizing the conflict between parties and avoiding litigation and arbitration.
- Developed a rational platform to help decision makers to select the most suitable method that would satisfy the client's needs and be up to his expectation.
- Due to the current circumstances of Gaza Strip where siege come into play, procurement methods shall address the local factors influencing the selection of suitable procurement method.

1.3 Research Aim

The aim of this research is to provide a platform of knowledge for the construction management practitioners about the impacts of applying procurement management on the construction projects.

1.4 Research objectives

The main objectives of this study are summarized as the following:

1. To review procurement management systems.

2. To assess the impacts of procurement management systems on the construction projects.
3. To compile a list of the different factors affecting the selection of procurement management systems and determine the most important factors.
4. To identify the most common factors affecting on the procurement system in Gaza strip.

1.5 Statement of the problem

While the procurement process is the keystone of the construction project, whether it is labor, material, equipment or consultant procurement, it is imperative to develop a rational and systematic approach regarding the selection of the most suitable procurement method. Inappropriate procurement method would yield unsatisfactory results in terms of time, cost and quality from the client's perspective. Moreover, it would lead to disputes and allegations between parties.

To overcome the problems arising from implementing unsuitable procurement method, the factors supporting the decision-making concerning the selection criteria will be identified, evaluated and examined in terms of their effects to the procurement systems practice.

1.6 Research limitations

This thesis is restricted by the following limitations:

- This research will take into account the locally conventional widely used procurement methods for construction work only. Any uncommon rarely used methods will be neglected, for practical purposes,
- For the sake of generality and getting a wide point of view, the research will take into account the opinion of two work-related parties beside the clients, i.e., procurement experts and contractors. However, for practical reasons, stakeholders, shareholders, regulators and any other parties will not be involved,
- Civil engineers who has a valid registration in the Engineering Association will be involved in this study. Revoked consultants will not be included, and;
- Collected data throughout this research will cover the last ten years, only.

1.7 Thesis structure

This research consists of six main chapters as followings

- **Chapter one:** Introduction: this chapter shows the main objectives of research, statement of the problem and limitations of research;

- **Chapter two:** Literature review: this chapter shows a historical review from previous studied to identify the main factors influencing the selection of procurement system in 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:** Developing a framework: this chapter shows data collection, data analysis, verification and framework design.
- **Chapter six:** Conclusion and recommendations.
- **Appendix.**

Chapter 2

Chapter 2: Background and Literature Review

2.1 Introduction and definitions

Since "Procurement Method" is the keystone for the construction projects, and choosing a suitable procurement method would result in a good success of the project plan, it is vital to start some of the definitions of the procurement system, listing both advantages and disadvantages, and pointing out the places and projects where certain methods are more favorable than the others.

(Weele, 2010) Defined "Procurement" as a broad term to be "the acquisition of goods, services or works from an external source. It is favorable that the goods, services or works are appropriate and that they are procured at the best possible cost to meet the needs of the acquirer in terms of quality and quantity, time, and location.". Procurement strategy is the outcome of a series of decisions, which are made during the early stages of a project, and it is one of the most important decisions facing the project client (Odhigu, et al., 2005). A successful procurement system is one, which leads to a completed project, which meets the client's objectives. In addition, the selection and use of an appropriate procurement system contributes significantly to the success of a construction project (Mortledge, et al., 2006).

While (Masterman, 1992) defined it as an organizational structure adopted by the client for the implementation and at times eventual operation of a project. Meanwhile, according to (Rameezdeen, et al., 2006), procurement is a key means through which the clients create the pre-conditions for the successful achievement of project-specific objectives. For (Love, et al., 1998), the procurement method is an organizational system that assigns specific responsibilities and authorities to people and organizations, and defined the relationship of the various elements in the construction industry.

Whereas, (Walker and Rowlinson, 2008) defined procurement system as the acquisition of project resources for the realization of a constructed facility. According to (Love, et al., 1998), A procurement system (or sometimes known as delivery system) is "an organizational system that assigns specific responsibilities and authorities to people and organizations, and defines the various elements in the construction of a project.

Some of the terms in the construction industry are considered synonymous with procurement systems include terms such as project approach, procurement delivery methods, project delivery systems and contractual arrangements. Therefore, for the purpose of this study, the term procurement system has been adopted as a contemporary term to refer to all the terms synonymous with it.

According to (Leadra, et al., 2006), the procurement systems (routes) deliver the procurement strategy or what the author can refer to as the procurement process, which according to the author is a key factor in determining the success or failure of any particular project. (Leadra, et al., 2006) Highlight the fact that even though terminologies used in the description of procurement systems differ from one country to the other, the recommended

practice for selection of the procurement systems is almost the same across country boundaries.

For (Samarasinghe, et al., 2012) purchasing is "a fundamental function of material procurement that refers to the acquisition of goods and services and an establishment of mutually acceptable terms and conditions between a seller and a buyer".

2.2 A Brief historical background

Until the technological developments of the past 20 years, conventional ideology regarded procurement as the practice-based administrative process of buying the goods and services required to satisfy the functional needs of managers. Rules, regulations, procedures and protocols were typical of the process. Procurement staff stood as financial and operating sentinels between the managers and their material requirements, centralizing the supply task and creating management control over expenditure. Procurement was both a powerful and sometimes hated position with its virtual monopoly over acquisition (CIPS Australia, 2007).

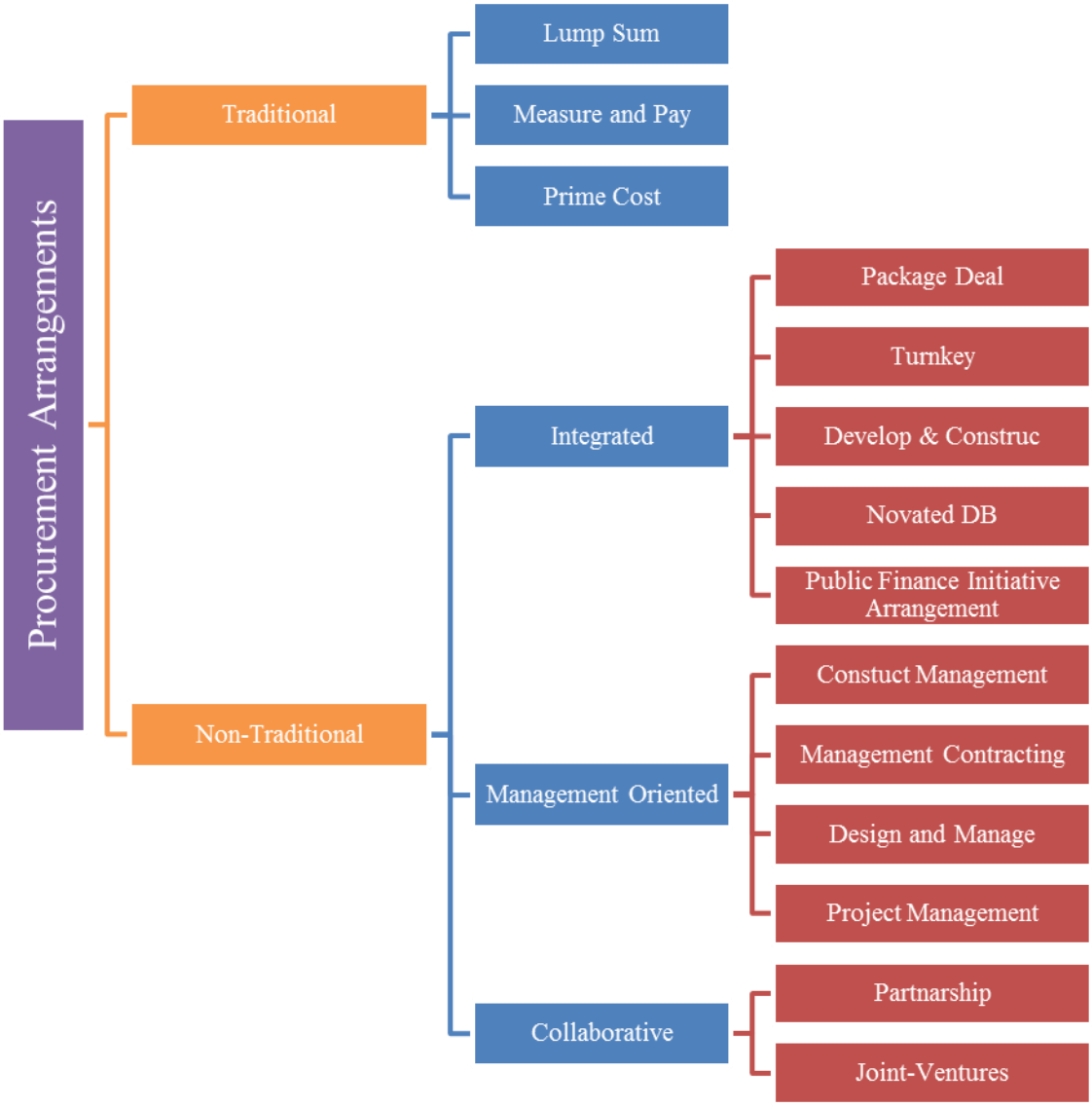
Some researchers suggested that the modern evolution of procurement is characterized by the principal business and government requirements of the time. For example, (Monzcka, et al., 2002) suggested that the evolution of procurement can be traced through a number of stages: emergence around the mid-nineteenth, through a period of recognition before World War II, rapid increase in sophistication in procurement during that War, followed by a period of quiet gestation. However, in the last 35 years, the profession had moved into a period of major reform in materials management and faced the challenges of globalization, technological change and the emergence of supply chain management.

In the last decade, there was continues growth in the construction industry accompanied with development in the procurement systems. With the large-scale projects, a remarkable implementation of more advance and sophisticated procurement methods was observed, with more implementing of the "Design and Construct" method. This could be attributed to the need of a fast and fixable construction process. (Larmour, 2011) Stated that this decade also saw a shift in the procurement method for public sector projects. The increased use of private finance to fund public projects, and a desire to meet the collaborating.

2.3 Procurement Systems

As shown in Figure (2.1), Procurement systems can be categorized into two main categories, i.e., the traditional procurement system and the nontraditional procurement system. The traditional procurement has three contracting arrangements, i.e. lump sum, measure and pay and the prime cost. While the nontraditional procurement system has three major subcategory contracting arrangements, i.e. integrated, management oriented and

collaborative. Each procurement contracting arrangement of the nontraditional procurement system has several subcategories beneath it (Rameezdeen, et al., 2002).
Sub-classifications of these systems have tended to proliferate in a response to market demands. (Holt, et al., 2000) Stated that there are so many variables to each of the commonly adopted procurement strategies, notwithstanding the commonly adopted nomenclature, there is a very wide range of strategies available. For example, the (New South Wales Government (NSW), 2005) in their procurement guidelines identifies more than eight variants of the design and construct system. However, there is a range of commonly adopted procurement system and contract methods and each of these is described below.



Figure(2.1): Categorization of Procurement Arrangements, ***(Rameezdeen, et al., 2002)***

Under the traditional approach, there is no clear link between the design and the construction works. Consultant is hired to carry out both the design and the cost-relating issues, while the contractor is hired to carry out the construction work (Davis, et al., 2008). According to (Masterman, 1992), there are three different contracts fallen under the traditional procurement system, i.e., Lump sum contracts, Measurement contracts and Cost reimbursement.

Tradition Procured is delivered in a consecutive manner, where the design phase is mostly to be completed before the construction works start. Moreover, management is a shared task between the consultant and the contractor, and there is therefore little scope for involvement of either of the parties in the other's activities. (Odhigu, et al., 2005) Stated situations where traditional procurement system would be preferable, those situations are when product quality is wanted; Price certainty is wanted before the start of construction; a program allows sufficient time; a balance of risk is to be placed between the client and contractors; and a client wishes to appoint designers and contractors separately.

However, many of today's construction and engineering projects are very costly and highly complex, employing new materials and technologically advance construction methods. Typically, demands are being made upon the construction process not just in terms of time, cost and quality, buy also in those of project organization, management and procurement. Prior to mid-1980s, the mainstream of the construction industry in developed countries has followed traditional methods of procurement. Many clients today, however, are increasingly dissatisfied with the traditional approach and its operational characteristics and actively seek alternative methods of procurement, organization and management to meet their increasingly complex demands.

One consequence of the above has been the global development of new, alternative procurement methods, which can be categorized by the way in which the interaction between the design and construction of the project is managed, to integrated procurement systems, management-oriented procurement system and in more recent time, partnering (Turina, et al., 2008).

This is where the "Design and Construct" of the integrated procurement system became a feasible alternative for the traditional procurement system. Where all of these elements of managing and design and construction merge into two basic elements of "design and built" and become the responsibility of one organization, mostly but not always, the contractor.

(Masterman, 1992) Defines the "Design and Construct" procurement system as "An arrangement where one contracting organization takes sole responsibility, normally on a lump sum fixed price basis, for the bespoke design and construction of a client's project".

Through the "Design and Construct" Procurement System (DSPS), a single organization is carrying out both the design and construct work. While the client only awards the contract, thus this form is the most straightforward from the perspective of responsibility and communication. The organization in charge of the project will likely deliver the greatest performance benefits to the client through innovation, standardization and integrated supply

chain. Furthermore, many surveys have established that clients perceive the design and build system as providing better value for money, and giving rise to less disputes than other procurement systems, and the surveys suggest that, an experienced client with a clear brief can use it satisfactorily with projects of most sizes (Odhigu, et al., 2005).

The ability of the "Design and Construct" to fulfill the needs of the clients' are far advanced than the traditional procurement system. Where simplified contractual arrangements could be obtained between the client and the contractor, with a total responsibility given to the contractor including the responsibility to hire subcontractors and suppliers. Besides that, it integrate the design and the construction processes, encourages professionals to work towards the real interests of the client. Moreover, it improves communication between the designing team and the implementation team.

The operational efficiency of this procurement system is highly remarkable, where the client knows at any time whom to contact, i.e. contractor. In addition, the "design and built" procurement system can reduce both the duration by allowing the overlap in the design and construct process, and cost where the client will know to a certain point of accuracy the financial commitment before commencing work on site. Both performance will maximized due to the detailed designs from the designing team, and change will be minimized due to solid designs and high level of compatibility between designing and construction teams (Turina, et al., 2008).

Another form of the nontraditional procurement system is the "Management Procurement System" (MPS), which fall into the management-oriented procurement system. In which several variants of management procurement forms exist, which include management contracting, construction management and design and manage. There are some subtle differences between these procurement methods. In the case of management contracting, the contractor has direct contractual links with all the works contractors and is responsible for all construction work. In construction management, a contractor is paid a fee to professionally manage, develop a program and coordinate the design and construction activities, and to facilitate collaboration to improve the project's constructability (Davis, et al., 2008). A design and manage strategy is similar to management contracting. Under a design and manage contract, the contractor is paid a fee and assumes responsibility, not only for works contractors, but also for the design team. The common variations of design and manage are the contractor where he plays the role of a project design and management organization designs and manages the work, generally for a fee and delivers the project by employing works contractors as its subcontractors to design/or construct. While the consultant plays the role of a project, designer/manager, who designs and manages the work, obtains subcontract tenders from works contractors who then each enter into a direct contract with the client (Turner, 1990).

Finally, there is the "Collaborative Procurement System" (CPS). A procurement system said to be collaborative when buyers from different organizations collaborate in order to achieve greater efficiency and better negotiating power with suppliers; we refer to this as a "buyer–buyer relationship." It may be that because public sector organizations have similar

goals and objectives, collaboration is easier in buyer–buyer relationships than in buyer–supplier or supplier–supplier relationships (Elmer Christine, 2013). Collaborating, a concept, which provides a governance framework for the establishment of collaboration, can be beneficial for all parties involved if implemented successfully. Construction collaborating case studies in various countries (Chan, et al., 2003; Eriksson and Nilsson, 2008; Naoum, 2003; (Bresnen and Marshall, 2002) Argue that collaborating increases the possibility that projects are completed within budget, on time, with the least number of conflicts, claims and work defects, and with a good client-contractor relationship (Löfgren, et al., 2009). One quantitative study, conducted by (Larson, 1995), supports that partnering projects achieve superior results in controlling costs, technical performance, and in satisfying customers compared to non-partnering projects. Another more recent investigation conducted by (Nyström, 2007), did not however find any clear differences in project performance when comparing the performances of ten partnering projects with ten similar non-partnering projects. Hence, there is a comprehensible need for similar quantitative studies on how collaborating and collaboration affect project performance today.

(Cartlidge, 2002) Stated that under a collaborative system, the client lays down a framework for the overall administration of the project within which he/she has the discretion to use the most appropriate of all the procurement systems contained within the other three categories. In a collaborative procurement system, quantity surveyors play an integral role by providing a wide range of services, which include contractual issues; it also offers quantity surveyors an opportunity to act as independent advisors within the system.

2.4 Selection of Procurement Method

Many factors in today's global market have influenced companies to search for a competitive advantage by focusing attention on their entire supply chain. Of the various activities involved in supply chain management, purchasing is one of strategic because it provides companies with opportunities to reduce costs and, consequently, increase profits. It has been estimated that the selection of an appropriate procurement system could reduce the construction project cost by 5% of its total cost (Business Roundtable, 1982). An essential task within the purchasing function is procurement method selection. In most industries, the cost of raw materials and component parts represents the largest percentage of the total product cost. For instance, in high technology firms, purchased materials and services account for up to 80% of the total product cost (Weber, et al., 1991). Therefore, selecting the right suppliers is key to the procurement process and represents a major opportunity for companies to reduce costs across its entire supply chain (Mendoza, 2007). Supplier selection is the purchasing function that forms the foundation for the success or failure of projects. Therefore, supplier selection criteria should be well defined. Supplier selection is a multi-criteria decision making problem, which includes both qualitative and

quantitative considerations. A trade-off between tangible and intangible criteria is important in selecting the best supplier (Samarasinghe, et al., 2012).

One of the strongest criticisms to the procurement system selections was the variables used in the selection models. The other, is the utility developed through opinions of the industry experts. Particularly, there is critical criticisms about the subjective nature of assigning values to procurement selection parameters to obtain mean utility values. Another relevant question is that, in reality, does the client or his representative use a structured model for the selection rather than unstructured and ad hock? (Shiyamini, 2005).

The increasing importance of supply chain management is motivating companies to fit purchasing and sourcing strategies into their supply chain objectives. One of the purchasing functions is selecting suppliers capable of procuring the demanded items that meet the required specifications. Thus, supplier selection is an essential task of purchasing (Monczka, et al., 2005). Purchasing as a whole plays a key role in corporate strategic success through the appropriate selection of suppliers supporting the company's long-term strategy and competitive positioning (Ellram, et al., 1994).

Since every procurement system has its exclusive characteristics, advantages and constraints, there is hardly any single best system that could suit all kinds of clients and projects (Nahapiet H., et al., 1985). The selection of a procurement system therefore becomes a very important task for the clients, as employing an inappropriate procurement system may lead to project failure (Chua, et al., 1999). The consequences may be time and cost overruns and/or general dissatisfaction (Bennett, et al., 1990; Sharif, et al., 1994).

The selection of an appropriate procurement system depends largely on the accurate identification of client requirements. Many researchers have attempted to compile a list of client requirements that might affect the selection of a procurement system (Masterman, et al., 1994). According to (S.Thomas, et al., 2002) nine common factors affecting the selection of procurement systems. Those factors are Speed, certainty of completion time, certainty of price, quality level, flexibility, responsibility, complexity, price competition and risks allocation/avoidance.

It was found out that only time certainty and price certainty were as unambiguous criteria, as the completion date and price could be objectively predicted by the client beforehand. However, the other seven were regarded by the experts as subjective. Different perceptions of the remaining seven factors would yield different recommendations for procurement system.

Numerous techniques exist for the selection of procurement system. The choice of procurement system is now so wide and projects are becoming so complex, that the selection process needs to be carried out in a disciplined and objective manner within the framework of the clients overall strategic project objectives.

Nevertheless, the major difficulties associated with procurement selection include:

- No single person, has been found who is familiar with all the primary procurement methods (Hamiliton, 1987)

- No consensus has been found between experts which easily systemizes procurement selection; and
- No mutually exclusive sets of criteria uniquely and completely determine the appropriate procurement method for a specific project (Ireland, 1985).

The selection and use of an appropriate procurement system are fundamental to the success of a construction project. However, the procurement selection process involves the analysis of complex and dynamic criteria such as cost certainty, time certainty, speed, flexibility, etc. Procurement selection is therefore, plagued with uncertainty and vagueness that is difficult to be represented by a generalized set of rules. In reality, decisions in procurement selection are usually derived from intuition and experience (Luu, et al., 2003).

(Thwala, et al., 2012) Used the triangulation approach to investigate factors influencing the selection of procurement systems in the South African construction industry. It was established after factor analysis that five factors significantly influence the selection of procurement systems. The five factors in the order of importance in terms of their utility value scores are procurement policy, project characteristics, socio-economic consideration, capital cost, and client requirements.

The study further revealed that, although the procurement choice or the utility value (level of satisfaction) by different procurement decision-makers is not in total agreement with each other, the utility value of any particular procurement type does not have a significant influence on the choice of procurement system. Based on that, Construction planners, managers and all other stakeholders involved in procurement decision-making should formulate a systematic selection approach, as this will assist in eliminating unnecessary project demands.

Factors that influence the selection of procurement systems cut across all the phases of the project. Therefore, these factors are categorically classified into internal and external factors. Factors from the internal environment were further classified into client characteristics and project characteristics.

1. <u>Internal Factors</u>
   A. Client Characteristics:
      - clients' level of knowledge and control,
      - Political and social consideration,
      - Familiarity of procurement systems,
      - Competition,
      - Funding arrangement,
      - Government public/private sector projects, and
      - Risk allocation.
   B. Project Characteristics:
      - Size and technical complexity of the project,
      - Influence of the project life cycle,
      - Expedited project delivery,

- Time, and
- Quality and Price certainty.

2. External Factors:
   - Market competition,
   - Information technology,
   - Regulatory environment,
   - Natural causes, and
   - Globalization.

The choice of different procurement methods in the construction industry is now so varied, and this has resulted in the need to conduct a selection process for any specific project in a disciplined and systematic manner. A useful guideline can be drawn based on the three criteria of determining project success of time, cost and quality. The Traditional method will benefit in Cost and Quality but at the expense of Time. The Design and Build method will benefit Cost and Time but at the expense of Quality. The Management Contracting method will benefit in Time and Quality but at the expense of Cost. The aforementioned factors can be used as a guideline for the professional building team before any commitment is made on the choice of the procurement method for their construction projects.

(Love, et al., 1998) Used the following criteria to examine client requirements and hence, selecting the proper procurement system:

- Speed (during both design and construction);
- Certainty (price and the stipulated time and knowledge of how much the client has to pay at each period during the construction phase);
- Flexibility in accommodating design changes;
- Quality (contractors reputation, aesthetics and confidence in design);
- Complexity (client may specify particular subcontractor, or buildability analysis);
- Risk allocation/avoidance;
- Responsibility (completion of program, price, product quality, design and construction);
- Price competition (covering such issues as value for money, maintenance costs and competitive tendering); and
- Disputes and arbitration.

It was found out that the two most common procurement methods used by the clients are the traditional and novation and the Procurement Path Decision Chart. A simple set of criteria have been identified, as being generally adequate and sufficient for procurement

selection and that there is a reasonable consensus on their appropriate weightings for each path. Moreover, greater involvement and interaction between client and consultants is indicated for a more effective procurement process. It is suggested that participants have to put aside their own objectives by considering the clients strategic project objectives in a holistic manner. This can be effectively achieved with a project management organization, which acts as a control mechanism for the client and participants.

(Odhigu, et al., 2005) Investigated the impacts of procurement systems on the performance of construction projects in East Malaysia. The research showed that traditional procurement system benefits cost and quality but at the expense of time. In other words, traditional procurement system has positive impacts on project objectives of cost and quality and negative impact on project time. Design and build procurement system benefits cost and time but at the expense of quality and this implies that the impacts of design and build procurement system on project objectives of cost and time are positive with negative impact on project quality.

Furthermore, (Walker, et al., 2008) Indicate that, the main drivers that influence procurement choice relates to project characteristic (project type), project sponsors' expectations and their perceptions of what contributes value, and the extent to which the rules and methods to deliver the project may be known. In order for project to be successful, the procurement system should address the technical features of the project, the client, the contractor's needs and other relevant stakeholders' expectations.

(Shiyamini , et al., 2007) Proposed a selection model based on factors affecting the selection of procurement system in terms of client requirements & characteristics, project characteristics and external environment. Clients' requirements were focused on cost, time, quality and other general aspects, which affect the procurement system selection thus ensuring that the selection criteria have been focused at macro level. The overall factors that affect the selection process are listed in Table(2. 1).

Table(2. 1): Macro level factors affecting the selection of procurement system

CLIENTS' REQUIREMENTS	PROJECT CHARACTERISTICS
Cost Related Factors	- Project type
- Capital cost	- Project size
- Maintenance cost	- Project cost
- Prequalification and tendering cost	- Degree of flexibility
- Financial risk	- Degree of complexity
- Price competition	- Time constrains
- Completion within the budget	- Payment method
Time Related Factors	- Integration of design and construction
- Planning and designing time	- Project funding method
- Tendering and evaluation time	- Project site location
- Construction time	- Site risk factors
- The early start of the project	- Construction method
- Speed of construction	- Degree of innovative technology involvement
- Time overruns	**EXTERNAL ENVIRONMENT**
- Quick response to clients new requirements	- Market's competitiveness
- Maximizing of activities interfacing	- Government as a policy maker
- Stage completion	- Government as a major client
Quality Related Factors	- Regulatory feasibility
- Design reliability	- Technological feasibility
- Aesthetic appearance of the building	- Source of finance for the project
- Workmanship	- Experienced contractor availability
- Functionality	- Education of builders
- Design innovation	- Economic condition of the country
- General Needs	- Availability of material
- Allocation of responsibility	- Information Technology
- Professional team performance	- Influence of Intuitional bodies
- Parties involvements	- Natural disaster
- Accountability	- Industrial actions
- Transparency	- Socio cultural differences
- Safety requirements	- Goodwill of the contractor
- Corporation and motivation	- Environmental issues
- Existing building operation	- Civil war condition
- Familiarity	- Objections from neighbors / public
- Tender evaluation criteria	
- Clear express of end user's requirements	
- Flexibility	
- Consultants' attitude towards clients	
- Types of client	

The results of factor analysis revealed nine significant factors from client requirements, six factors from the project characteristics and five factors from the external environment, as showing in.خطأ! لم يتم العثور على مصدر المرجع.2).

Based on the analysis of the survey used to collect the data, it could be said fairly that the selection of appropriate procurement system is not a simple task. However, the

Table(2.2): Significant Factors affecting the selection of procurement system

Selection Criteria	
Client's Requirements	Risk management
	Time availability and
	Predictability
	Price Certainty
	Price Competition
	Accountability
	Flexibility for Changes
	Quality of Work
	Responsibility and
	Project Cost and
Project Characteristics	Funding method
	Project Complexity
	Project Type
	Time Constrains
	Degree of Flexibility
	Payment Modality
External Environment	Market competition
	Economic condition and
	The fiscal policy
	Technology
	Socio cultural suitability

procurement selection procedure could be improved by developing a structured procedure based on a set of relevant selection criteria. Clients should establish a set of appropriate selection criteria based on their ultimate requirements & distinctive characteristics, project characteristics and external environment. The selection criteria should be logically derived from project's internal and external environment.

(Love, et al., 1998) Found that 70% of clients who were satisfied with the procurement of their buildings implemented a design and build system, whereas the remaining 30% implemented a traditional system. Moreover, it was found that clients had all used an independent project manager as their representative and principal adviser. Clients were

questioned on the factors that contributed to their satisfaction. The following fundamental factors were identified:

- Completion of the project on time and to budget;
- Completion to the desired technical specification and quality;
- Teamwork and commitment from all participants;
- Ability of participants to understand the goals and objectives of the project;
- Effective communication both formally and informally between participants; and
- An independent project manager.

(Jayasuriya and Rameezdeen, 2008) Studied the selection of procurement system based on the nature of the project, i.e. routine construction project vs. disaster reconstruction projects.

It was found out that factors affecting the routine construction projects are time certainty, cost certainty, speed, flexibility, responsibility, complexity, price competition, risk allocation, and quality. And while these factors are crucial to procurement selection of a routine project, the same factors might not be appropriate for a disaster reconstruction project. Even if they are found to be suitable , the priorities might be different. The task of reconstruction after a major disaster event can be an onerous challenge. It requires deliberate and coordinated efforts of all stakeholders for effective and efficient recovery of the affected community.

Davidson, et al. (2007) Identified following major challenges for the post disaster reconstruction, as following:

- The scene is generally very chaotic and resources are in scare supply, with simultaneous projects being launched by numerous local and international organizations for housing and infrastructure repairs, for livelihoods creation and for a range of other social programs.
- Project must be completed as quickly as possible to foster recovery and to satisfy donors who want to see results.
- The post disaster period is generally seen as good opportunity to engage in activities that will increase the level of development and reduce vulnerability to future disasters, implying that projects must be implemented with sustainability in mind.

(Wilkinson, et al., 2006) Noted following requirements to be met by a procurement method used for disaster reconstruction.

1. Short time for rebuilding,
2. Low cost,
3. Use of local labor, material and plant,

4. Well-developed communication link between the parties,
5. Well-developed relationships between the parties, and
6. Local industry familiarity with the construction procurement framework.

The selection of the procurement system to be used throughout the rest of the project shall be made as early as possible. The risks associated with each procurement system and how they can affect the client should be considered. In design and construct forms of procurement the contractor predominately assumes the risk for design and construction of the project. Design and construct variations exist where the level of design risk can be apportioned more evenly, for example, novation. With traditional lump sum contracts, the intention is that there should usually be a fair and balance of risk between parties. The balance can be adjusted as required, but the greater the risk to be assumed by the contractor, the higher the tender figure is likely to be. With management forms of procurement, the balance of risk is most onerous for the client as the contractor is providing only 'management expertise' to a project. However, under a design and manage method a high of risk can be placed on the contractor for design integration (Davis, et al., 2008).

(Rameezdeen, et al., 2002) Studied the trend of construction procurement system in Sri-Lanka. Results highlighted the dominance of separated procurement systems, i.e. traditional system. However, it can be noted that the share of separated systems as a whole is diminishing, paving the way for the implementation of other systems. For the factors affecting the change in the use of procurement systems, it was found out that external factors lead to this change, i.e. the political factors, economical factors, technological factors, financial factors, and many other factors. Those environmental factors influence the industry in various way, thus, determining the procurement shares and trends.

The economical aspect enhanced the design and management procurement system after the decrease in construction workload and high inflation, where contractors diversifying into areas of design and management to ensure adequate work for survival. On the technological side, the new technologies increased the complexity of the construction projects; this led the industry to seek improved project organizations procedures and practices in order to be in line with those technologies. While the government policies played a major role in the construction industry through playing the role of a major client, regulating authority and administrator of the development of the industry.

The financial factors come into play where most developing countries frequently obtain finance for major development projects through development aid funds, Both bi-lateral and multi-lateral aid constitute a major portion of the development budget. These lending institutions essentially safeguard their interests by dictating the methodologies that the borrowers should follow. The procurement route is one such area where their advice is focused. For example, if the project is funded by World Bank or Asian Development Bank, the procedures for procurement will be according to their whims and fancies. Thus, the issue of client's choice in the procurement of major construction projects becomes secondary to the perceived benefits of financial arrangements.

Over the years, various procurement selection models have been developed to help the client choose the most appropriate procurement system for their specific needs (Ireland, 1985; Skitmore, et al., 1988; Masterman, 1992). For example, work done by (Skitmore, et al., 1988) modified the multiattribute technique of Building Economic Development Committee procurement path decision chart and went on to use discriminant analysis to distinguish between the different procurement paths for decision-making purpose. The main difficulties associated with those models are the following:

- All models seem to ignore some important factors in the selection of the most appropriate procurement system.
- The available options in the database of a number of existing models are limited.
- Some of the models are conditional and cannot be used by any client.
- Some of the models require the use of advanced mathematical technique, which are considered time consuming.
- A number of the existing models adopt a primitive approach to the selection process and limit the number of options to be considered.

Against those shortcomings in the models used to select the procurement system, (Alhazmi, et al., 2000) proposed the Project Procurement System Selection Model (PPSSM).
The model is based a framework to be used in evaluating the activities associated with the design and construction of a project in relation to various procurement system. This framework concentrate on examining the relationship between different procurement systems with reference to the following six criteria:

1. Project Characteristics,
2. Market attributes,
3. Contractor and architect/engineer (A/E) needs,
4. Categories of client,
5. Client design organization, and
6. Local design and construction regulations.

In this framework, client's need are listed into four categories:

1. Cost,
2. Time,
3. Quality, and
4. General needs.

Based on the testing model adopted through the study, five procurement systems were eliminated based on the feasibility ranking criteria. Those models systems are traditional method, two-stage tendering, continuity contracts, serial contracts and cost-reimbursable contracts. Another screening phase were used to evaluate the remaining procurement

methods based on the advantages and disadvantages of each procurement system. It was found out that both negotiation and turnkey methods could be considered as inappropriate when being compared to the others. The third screening phase was a weighted evaluation process to identify the optimum procurement system with reference to the criteria considered influential in the selection process. Results indicated that mean values of both "package deals" and "develop and construct" falls into the fair range, and to be eliminated. This study concluded that the PPSSM have the potential to assist the client in the construction industry in the procurement system selection. The outcome of the survey indicated that public clients in Sudia Arabia – were the survey was distributed – selected the design and built as the most appropriate procurement system for their projects.

(Wijewardana, et al., 2013) Studied the impact of government policies and regulations on the selecting process of proper procurement system, where the government is an important participant in the construction industry of every country, playing the role of a major client, regulating authority and the administrator of the development of the industry. Government policies and regulations are very rigid external factors, which affect to the construction procurement selection. This could be seen where the clients have to follow government procedure in choosing a particular procurement rout to construction project. The conclusions concerning the Sri-Lankan construction industry is that a few number of procurement methods are used. Even though there are many problems occurred with conventional procurement methods, alternative procurement methods are hardly appeared in Sri Lankan context. Government of every country plays an important and major role in construction industry as the major client and the major regulating authority. As a major regulating authority, government has introduced policies and regulations, which affected to the construction industry. Therefore, government policies and regulations on construction industry are likely to significantly affect the adoption of alternative procurement methods.

2.5 Needs for different procurement methods

(Shiyamini , et al., 2007) Reported that, different procurement systems are used for different projects and the precise choice may help to avoid problems and be the key to the attainment of project specific goals. (Tookey, et al., 2001) Stated that in today there are number of different types of procurement routes available for clients to choose from which has their own proponents and inherent strengths and weaknesses. Therefore, a choosing procurement method is very crucial in construction project. To satisfy the requirement of time completion on time or earlier a plethora of non-traditional procurement methods have emerged in the marketplace, which has resulted in design and construction schedules being compressed and construction commencing before the final design is complete (Hanna, et al., 1999).

Therefore, there should be different procurement methods existing to choose the proper one for particular project. According to (Love , et al., 2008) choosing the appropriate procurement system for construction projects is a complex and challenging task for clients

particularly when professional advice has not been sought. (Eriksson, et al., 2010) Reported that in recent years there has been an increasing interest in world about the use of collaborating in order to improve collaboration among construction project actors. The value that lies in having this model tested is potentially great as the construction literature has many indications that cooperation and collaboration may be a good strategy for achieving project success.

2.6 Local Studies

(ElAgha, 2013) Carried out a study to investigate procurement systems in Gaza Strip and factors affecting the selection of the optimum procurement systems. The results of the survey questionnaire, which was distributed among procurement experts and consultant, indicated that

The top six significant factors that have most influence on the selection of procurement methods in the Gaza Strip in construction projects are: price competition; degree of project complexity; time constrains of project; project size; client's financial capability and client's experience in procurement methods. This research concludes that there is no variety of procurement methods used in the Gaza Strip construction industry where a traditional procurement method with a measure and pay method based on bill of quantities is preferred. This is because of the most of professionals' in Gaza Strip are not familiar and not widely experienced with the other alternative procurement methods.

One of the main recommendations of this research is to use the proposed conceptual framework using the multi-attribute utility approach (MAUA) as a decision support system for the selection of appropriate procurement method for construction projects in the Gaza Strip.

The findings from the empirical survey of this study show that there are twelve most influential factors/criteria affecting the selection of procurement method in construction projects in Gaza Strip, which are:

1. Price competition,
2. Degree of project complexity,
3. Time constrains of project,
4. Project size,
5. Client's financial capability,
6. Client's experience in procurement methods,
7. Availability of qualified personnel (procurement staff),
8. Risk avoidance/allocation,
9. Project type and nature,
10. Availability of procurement system in the local market,
11. Responsibility allocation,
12. Procurement policy.

While the six least influential factors, as evaluated by procurement specialists and consultants, are:

1. Material availability,
2. Geotechnical investigation,
3. Stakeholder integration,
4. Delays in obtaining environmental approval,
5. Environment impact, and
6. Social factors.

The results also give a general indication that both the conventional (traditional) and non-conventional procurement methods are currently embraced in Gaza Strip. This study reveals approximately two-thirds (69.10%) of construction projects are executed using variants of traditional procurement method; 20.60% are through variants of management procurement method; 7.40% are executed through design and build method; and 2.90% are executed through public private partnership PPP (collaborative) method in Gaza.

Results also indicated that procurement methods in use are still much of variants of traditional methods. Gaza Strip construction remains in the phase of almost exclusively using traditional methods. This may be likely due to procurement staff and consultants are well familiar with traditional methods and this familiarity was found regarding to a long age existence of the traditional procurement systems in the Gaza Strip construction industry. It could be noted that the percentages of the use of design and build and PPPP (collaborative) methods are still significantly very low, indicating that the clients and their representatives are still not well familiar with this variant of non-conventional procurement system, or are yet to appreciate their advantages. The results of the study indicate that only 8.80% are familiar with design and build method while 4.40% are familiar with PPP procurement method.

(Al-Shorafa, 2009) Amid through his research to develop a framework for the best practice of material supply chain process through the project phases that suits the local construction industry in order to help contractors to have the right materials in the right quantities (at the right place) at the right moment at minimal cost. This will assist contractors to improve their productivity, minimize losses and increase competitiveness. To realize the research aim, a survey questionnaire was used to achieve the following objectives: exploring the current practices of material supply chain process, identifying the important activities that form the material supply chain process, studying the contractor/ supplier relationship, studying the impact of the Israeli closure of the Gaza Strip on the material supply chain process, providing solution to the risks and uncertainties inherent in the construction industry, identifying the most occurred problems facing the contractors through the project phases and finally identifying the key factors that may contribute in integrating the phases of the material supply chain process.

The study reveals that contractor/supplier relationship is based on project-by-project basis. Most of the contractors do not form long-term agreement or partnership with the suppliers.

Competitive pricing is the most important criteria adopted for selection of the suppliers and it is primarily based on the lowest price. The study shows that different level of minimum buffer stocks and buffer time were advocated by the respondents to mitigate the uncertainties inherent in the construction setting and the problem of Israeli closure to the borders of the Gaza Strip. Poor communication among the parties involved is the common problem occurred in each phase of the material-supply chain process. Finally, the study reveals that understanding the client needs and objectives by the contractors, subcontractors and suppliers and committing to these needs and objectives, establishing a protocol for dealing effectively with disputes and problems that may arise between the project participant during the course of project implementation and establishing a system among the project participants for communication and share project information in timely and accurate manner, are the most key factors that contribute in integrating the project phases and the project participants.

(Enshassi, et al., 2012) Stated that a project can be procured using different procurement methods ranging from single source: direct hiring, negotiation, restrictive bid, to open competition procurement. An owner may select a contractor through competitive bidding, such as the lowest-bidder system and the non-lowest-bidder system. Procurement type is a critical decision because it defines the method to select the key player in the project, which is the construction firm that is expected to deliver the project. This decision greatly affects the performance because if the construction firm is not qualified to achieve the project goals, serious problems may arise during and after construction.

The finding obtained from three case studies exposed in Gaza Strip is the existence of a proportional relation between awarding bids to lowest price and the problems encountered during implementation when used a traditional procurement method. The three cases of the study were awarded to lowest price contractors; the results show the existence of the following problems:

1. Considerable delay in the project handover,
2. Disputes between the project partners,
3. Contractor's claims against the client which lead to disputes issues,
4. Low level of quality in some items, and
5. Increase of the final project cost.

Accordingly, there is a need to change the traditional system for contractor selection and awarding contracts from the “lowest price” to “multi-criteria selection” practices. This can be implemented by establishing alternative procurement methods to select contractors based on technical and financial criteria.

2.7 Chapter Summary

Throughout this chapter, the definitions of the procurement system were introduced, where different procurement system exists. A historical survey was carried out to check the

background of the procurement systems and its development over the years. While after, procurement systems were introduced based on their nature and categorized into two main groups, the traditional and nontraditional procurement systems, including the subcategories. The aim of this illustration is to shed some lights on those procurement systems and highlight the advantages and advantages.
In-detail, thorough and comprehensive literature review was carried out to identify the factors affecting the selection of the procurement system, including some models used to assist in selection of procurement systems.

Table (2.3) is designated to summarize the factors affecting the selection of the procurement system based on the literature review carried out in the aforementioned subsections. Factors are divided into three groups, i.e. clients' requirements, project characteristics and external factors, where the clients' requirement section will contain three subcategories, i.e. cost related factors, time related factors, quality related factors.

Table(2.3): Factors affecting the selection of the procurement system

#	FACTORS	SOURCES													
		(Bennett, et al., 1983)	**(NEDO, 1985)**	**(Skitmore, et al., 1988)**	**(Singh, 1990)**	**(Hewitt, 1985)**	**(Masterman, et al., 1994)**	**(Shiyamini , et al., 2007)**	**(S.Thomas, et al., 2002)**	**(Thwala, et al., 2012)**	**(Love , et al., 2008)**	**(Odhigu, et al., 2005)**	**(Love, et al., 1998)**	**(Jayasuriya, et al., 2008)**	**(Scottish Himes, 2000)**
CLIENTS' REQUIREMENTS															
Cost Related Factors															
1.	Risk Management							X							X
2.	Financial Risk									X					
3.	Price Certainty							X	X	X				X	
4.	Price Competition	X	X	X	X		X	X	X	X	X			X	
5.	Completion within the budget		X	X	X	X	X						X		
6.	Client knowledge/control/involvement						X			X					X
Time Related Factors															
7.	Time Certainty									X		X	X	X	
8.	Designing Phase Time										X				
9.	Certainty of Completion Time								X				X		
10.	Time availability and Predictability							X							
11.	Construction Time		X	X	X	X	X				X				
12.	Speed of construction	X	X	X	X				X					X	
Quality Related Factors															
13.	Confidence in Design								X		X				

#	FACTORS	SOURCES													
		(Bennett, et al., 1983)	**(NEDO, 1985)**	**(Skitmore, et al., 1988)**	**(Singh, 1990)**	**(Hewitt, 1985)**	**(Masterman, et al., 1994)**	**(Shiyamini , et al., 2007)**	**(S.Thomas, et al., 2002)**	**(Thwala, et al., 2012)**	**(Love , et al., 2008)**	**(Odhigu, et al., 2005)**	**(Love, et al., 1998)**	**(Jayasuriya, et al., 2008)**	**(Scottish Himes, 2000)**
14.	Aesthetic appearance	X	X	X	X						X				
15.	Allocation of responsibility	X	X	X	X	X	X		X					X	
16.	Parties involvements						X						X		
17.	Accountability						X								
18.	Familiarity							X		X					
19.	Clear express of users' requirements	X	X	X	X										
20.	Quality of Work							X							
21.	Contractor Reputation									X					
22.	Technical specification at End												X		
23.	Level of expertise involved												X		X
24.	Safety												X		
	PROJECT CHARACTERISTICS														
25.	Project Type							X							X
26.	Project Size									X					
27.	Project Cost							X				X	X		
28.	Degree of Flexibility	X	X	X	X	X		X	X		X			X	
29.	Degree of complexity	X	X	X	X			X	X	X	X			X	X
30.	Time constrains							X							
31.	Payment Method							X							
32.	Project funding method									X					

#	FACTORS	SOURCES													
		(Bennett, et al., 1983)	**(NEDO, 1985)**	**(Skitmore, et al., 1988)**	**(Singh, 1990)**	**(Hewitt, 1985)**	**(Masterman, et al., 1994)**	**(Shiyamini , et al., 2007)**	**(S.Thomas, et al., 2002)**	**(Thwala, et al., 2012)**	**(Love , et al., 2008)**	**(Odhigu, et al., 2005)**	**(Love, et al., 1998)**	**(Jayasuriya, et al., 2008)**	**(Scottish Himes, 2000)**
33.	Expedited project delivery									X					
34.	Influence of the project life cycle									X					
35.	Risks Allocation/Avoidance	X	X	X	X				X	X	X			X	
36.	Disputes and arbitration		X	X	X						X				
37.	Teamwork												X		
38.	Effective Communication												X		
39.	Risk assessment												X		
	EXTERNAL ENVIRONMENT														
40.	Market's competitiveness							X		X					
41.	Government as a policy maker									X					
42.	Government as a major client									X					
43.	Regulatory Environment							X		X					
44.	Economic condition of the country							X							
45.	Information Technology							X		X					
46.	Natural disaster									X					
47.	Political Considerations									X					
48.	Socio cultural differences							X		X					
49.	Globalization									X					

Chapter 3

Chapter 3: Methodology

3.1 Introduction

Chapter three presents the research methodology which is used to study the impacts of applying procurement management system on the construction projects. The methodology chapter includes information about the research strategy, research design, population, sample size, data collection, questionnaire design, questionnaire content, instrument validity, pilot study and analyzing the data.

3.2 Research strategy

Research can be defined as a systematic investigation or careful endeavour into study of materials and sources in order to establish facts and reach new conclusions or collate old facts (Oxford Dictionaries, 2013).

Research strategy can be defined as the way in which the research objectives can be questioned. There are two major types of research strategies, namely, quantitative research and qualitative research (Naoum, 2007). Quantitative approach in general refers to explaining phenomena by using numerical data that are analyzed using mathematically based methods particularly statistics. The greatest strength of quantitative research is that it produces quantifiable, reliable data that are usually generalizable to some larger population. Quantitative analysis also allows researchers to test specific hypotheses, in contrast to qualitative research, which is more exploratory (Crossman, 2013). Qualitative research is the second type of the scientific research; qualitative research is especially effective in obtaining culturally specific information about the values, opinions, behaviors, and social contexts of particular populations (QRCA, 2013). The quantitative approach will be the main strategy of research to collect the data and perspectives of the respondents.

3.3 Research design

Generally, research design directs the research strategy by defining and development of a plan of scientific investigation that will guide the collection and analysis of data. In order to investigate the research questions and hypotheses, a quantitative survey approach involving professionals (Architects, Civil engineers, Mechanical engineers, Electrical engineers, and any other related specialization) in Gaza strip, Palestine has been involved. The research technique was chosen as a questionnaire research to measure objectives.

This research was carried out in various phases that were undertaken to achieve the overall research objectives. These phases are:

First stage: Theme identification (Problem definition)

It was initiated to identify the problem, define the problem, establish aim, objectives, hypothesis and key research questions, and develop research plan/strategy by deciding on the research approach and deciding on the research technique.

Second stage: Literature Review

As part of this study a literature review was performed including collecting existing knowledge on the subject, reading and note-taking from different sources such as:

- Refereed academic research journals
- Refereed conferences
- Dissertations/theses
- Reports/occasional papers/ white papers
- Government publications
- Books

The review of literature for this study revealed several interesting points; the concept of the procurement management on the construction.

Third stage: Questionnaire design and development

Questionnaires have been widely used for descriptive and analytical surveys in order to find out facts, opinions and views on what is happening, who, where, how many or how much (Naoum, 2007). Through this stage, the following points have been identified: types of questions, the question format, the sequence of questions, and the covering letter.

Fourth stage: Face validity

Face validity was important to see whether the measurement procedure (the questionnaire) in the study appears to be a valid or not. It was a "common-sense" assessment by experts in the procurement management field and as well as experts in statistics.

Fifth stage: Pre-testing the questionnaire

Pre-testing the questionnaire was done to make sure that the questionnaire is going to deliver the right data and to ensure the quality of the collected data. In other words, pre-testing the questionnaire was important and necessary step to find out if the survey has any logic problems, if the questions are too hard to understand, if the wording of the questions is ambiguous, or if it has any response bias, etc. The pre-testing was conducted in two phases and each phase has been tested with 6 professionals in the procurement management industry in Gaza strip. The questionnaire was modified based on the results of the pre-testing, thus questions have become clear to be answered in a way that helps to achieve the target of the study.

Sixth stage: Pilot study

A trial run on the questionnaire was done before circulating it to the whole sample in order to get valuable responses and to detect areas of possible shortcomings. Pilot study test

proved that the questionnaire design (the internal consistency, and the structure of the questionnaire) is valid and that data collected were reliable.

Seventh stage: Sampling of the questionnaire

After piloting, the questionnaire was adopted and was distributed to the whole sample (convenience sample). An extensive sampling strategy was used to secure the suitable number of respondents for meaningful statistical analysis, by distributing the questionnaire to the target groups.

Eighth stage: Analysis and presentation of the results

To determine the direction of the study, the collected data have been analyzed quantitatively by Statistical Package for Social Science (SPSS) IBM version 22. It was done by converting the ordinal data to scale data. Two main statistical methodologies were used in the data quantitative analysis:

A. Descriptive Statistics, which summarizes data from a sample using indexes such as:
    1. Frequencies and Percentile (results can be presented in the form of tabulation, a bar chart, a pie chart or a graph).
    2. measures of central tendency (the mean)
    3. Measurement of dispersion based on the mean (standard deviation)
    4. Relative Important Index (RII)
    5. Factor analysis
    6. Normal distribution (depends on *central limit theorem*)
    7. Homogeneity of variances (Homoscedasticity)

B. The inferential statistics (bivariate) / test of hypotheses, which draws conclusions from data that are subject to random variation:
    1. Cross-tabulation analysis
    2. Pearson product-moment correlation coefficient/ Pearson's correlation coefficient (a parametric test
    3. The sample independent *t*-test to find out whether there is a significant difference in the mean between two groups (a parametric test)
    4. Analysis of variance (one way ANOVA) test (a parametric test)
    5. Scheffé's method for multiple comparisons

To present the results, an ‘interpretive-descriptive’ method of qualitative data analysis has been used, which contains the following tools: tabulation, bar chart, pie chart, and graph. Figure (3.1) illustrates the methodology flowchart.

Ninth stage: conclusion and recommendations

The final phase of the research included the conclusions and recommendations.

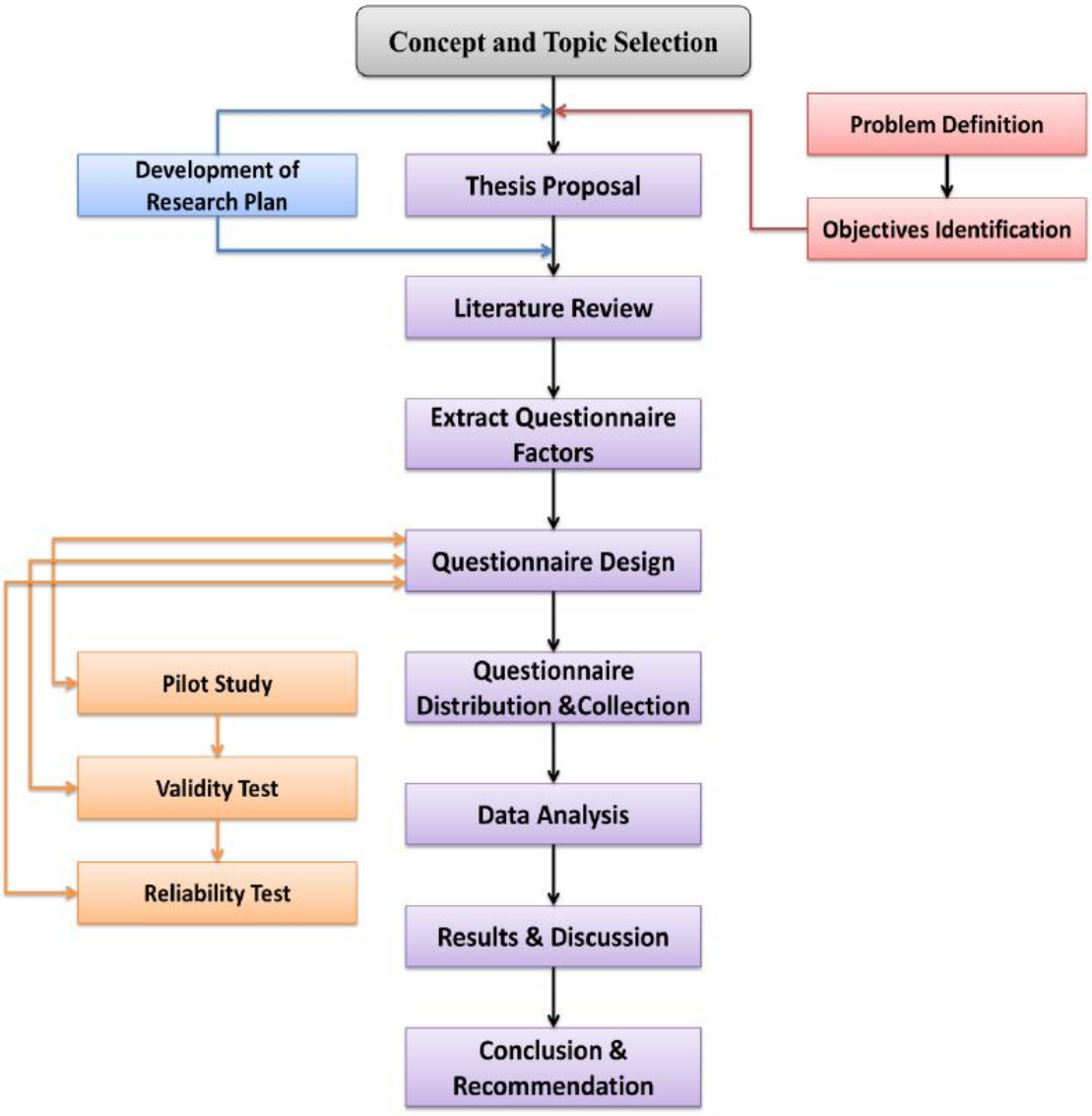


Figure 2(3.1): Methodology flowchart

3.4 Data Collection Methodology:

In order to collect the needed data for this research , we use the secondary resources in collecting data such as books, journals, statistics and web pages , in addition to preliminary resources that not available in secondary resources through distribute questionnaires on study population in order to get their opinions about procedures and policies in Supply Management in construction projects.

Research methodology depends on the analysis of data on the use of descriptive analysis, which depends on the poll and use the main program (SPSS).

3.5 Population:

The population of this study was selected to be the civil engineers who are registered in the Engineering Association and working as designers, site engineers, office engineers, construction managers and other positions for different employers such as contractors, consultants, owners and donors. 102 questionnaires were distributed to the research population and 92 questionnaires are received.

3.6 Sample size

Sampling refers to the statistical process of selecting and studying a representative few selected units instead of the large population to draw statistically valid inferences about the characteristics of the entire population. The following formula was used to determine the sample size.

$$n = \left[\frac{n'}{1 + \frac{n'}{N}}\right]$$

Where:
n' is the sample size from infinite population, which can be calculated from this formula [n'=S/V]. The definitions of all variable can be defined as the following:
n: sample size from finite population.
N: Total population (3695)
V: Standard error of sample population equal 0.05 for the confidence level 95 %, t=1.96.
S : Standard error variance of population elements, S P (1-P); maximum at P= 0.5
The sample size can be calculated from the previous equations as follows:

$$n = \left[\frac{100}{1 + \frac{100}{3695}}\right] = 98$$

3.7 Data collection

As previously mentioned the questionnaire was adopted to be the tool of data collection in this research. The questions of the questionnaire were constructed to obtain good results and warranting a high rate of return, these questions are constructed based on:

- Literature review which it seeks systematic reading of previous information which is related to the area of investigation.
- Pilot study which it involves testing, wordings, adding and deleting of questions.
- Several interviews with experts to obtain various opinions and thoughts which can be significant for questions formulation.
- The experience of the researcher and some engineers in the field of construction management.

3.8 Research location

This research has been conducted in Gaza Strip not including West Bank due to political situation. Gaza Strip is constituted of four governorates including Northern, Gaza, Middle, and Southern. Researcher was keen for survey distribution and data collection to cover most of these areas.

3.9 Research limitation

This research is limited to construction projects and also the civil engineers who are registered in the Engineers Association and working as designers, site engineers, office engineers, construction managers and other positions.

3.10 Face validity

Face validity was important to see whether the questionnaire appears to be a valid or not. It was a "common-sense" assessment by experts in the procurement managements field as well as experts in statistics (Salkind, 2010). The questionnaire was presented to 6 experts (from Gaza city as well as outside Palestine) by hand delivery and by email at different periods for assessment the validity of the questionnaire. Many useful and important modifications have been made for the questionnaire.

3.11 Questionnaire content

The questionnaire was provided with a covering letter explaining the purpose of the study, the way of responding, the aim of the research and the security of the information in order to encourage a high response. The questionnaire included multiple choice questions: which

used widely in the questionnaire, the variety in these questions aims first to meet the research objectives, and to collect all the necessary data that can support the discussion, results and recommendations in the research.

The sections in the questionnaire will verify the objectives in this research is to develop a clear understanding about procedures and policies in procurement management on the construction projects as the following:

Section One: General information about respondents consists from 6 items.

Section Two: General information about organization s consists from 5 items.

Section Three: procedures and policies in Supply Management in construction projects.

And sub divided into fields as follows:

1. Owner requirements contain 20 items, and divided into three sub fields.
   a) Factors related to the cost contain 6 items.
   b) Factors related to the time contain 4 items
   c) Factors related to the quality contain 10 items
2. Project Characteristics contains 10 items.
3. External Environment contains 9 items.

3.12 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 was/were an appropriate method/s that can be applied and not others. In this research, ordinal scales were used. Ordinal scale 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

(Naoum, 2007). Likert scales (originally devised by R. Likert in 1932) which were used in this questionnaire, are devices to discover strength of feeling or attitude towards a given statement or series of statements and the implication here is that the higher the category chosen, the greater the strength of agreement, but care has to be taken not to read too much in these ranked scales. They are usually a three, five or seven-point range and ask respondents to indicate rank order of agreement or disagreement by circling the appropriate number (Bell, 2005). For this study, the five-point scale was chosen as the showing in Table (3.1):

Table (3.1) lekart scale

Level	Very High Important	High Important	Medium important	Low important	Very low important
Scale	5	4	3	2	1

3.13 Pre-testing the questionnaire

Pre-testing the questionnaire was done to make sure that the questionnaire is going to deliver the right data and to ensure the quality of the collected data. In other words, pre-testing the questionnaire was important and necessary step to find out if the survey has any logic problems, if the questions are too hard to understand, if the wording of the questions is ambiguous, or if it has any response bias, etc. (Lavrakas, 2008). The pre-testing was conducted in two phases and each phase has been tested with 3 professionals in the construction industry in Gaza strip.

The first phase of the pre-testing resulted with some amendments to the wording of some words in the questions, in addition to add further explanation to some items to facilitate the understanding of the question. The questionnaire was modified based on the results of the first phase of the pre-testing. After that, the second phase was conducted and it was sufficient to ensure success of the questionnaire, where there were no any queries from any professional and everything was clear. According to that, questions have become clear to be answered in a way that helps to achieve the target of the study and to start the phase of the pilot study.

3.14 Pilot Study

After the success of the second phase of the pretesting of the questionnaire, a trial run on the questionnaire was done before circulating it to the whole sample in order to get valuable responses and to detect areas of possible shortcomings (Thomas, 2004). Bell (1996) described the pilot study as: "getting the bugs out of the instrument (questionnaire) so that subjects in the main study will experience no difficulties in completing it and so that the researcher can carry out a preliminary analysis to see whether the wording and format of questions will present any difficulties when the main data are analyzed" (cited in Naoum, 2007).

To do a pilot study, researcher needs to test all the survey steps from start to finish with a reasonably large sample. The tests that conducted were as follows:

1. Statistical validity of the questionnaire/ criterion related validity.
2. Reliability of the questionnaire by Half Split method and the Cronbach's Coefficient Alpha method.

3.15 Validity of the Research

We can define the validity of an instrument as a determination of the extent to which the instrument actually reflects the abstract construct being examined. "Validity refers to the degree to which an instrument measures what it is supposed to be measuring". High validity is the absence of systematic errors in the measuring instrument. When an instrument is valid; it truly reflects the concept it is supposed to measure. Achieving good validity

required the care in the research design and sample selection. The amended questionnaire was by the supervisor and three expertise in the tendering and bidding environments to evaluate the procedure of questions and the method of analyzing the results. The expertise agreed that the questionnaire was valid and suitable enough to measure the purpose that the questionnaire designed for.

3.15.1 Content Validity of the Questionnaire

Content validity test was conducted by consulting two groups of experts. The first was requested to evaluate and identify whether the questions agreed with the scope of the items and the extent to which these items reflect the concept of the research problem. The other was requested to evaluate that the instrument used is valid statistically and that the questionnaire was designed well enough to provide relations and tests between variables. The two groups of experts did agree that the questionnaire was valid and suitable enough to measure the concept of interest with some amendments.

3.15.2 Statistical Validity of the Questionnaire

To insure the validity of the questionnaire, two statistical tests should be applied. The first test is Criterion-related validity test (Pearson test) which measures the correlation coefficient between each item in the field and the whole field. The second test is structure validity test (Pearson 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.

3.15.3 Internal consistency:

Internal consistency of the questionnaire is measured by a scouting sample, which consisted of forty questionnaires, through measuring the correlation coefficients between each paragraph in one field and the whole filed. Tables No.'s (4,5,6) below show the correlation coefficient and p-value for each field items. As show in the Table the P-Values are less than 0.05 ,so the correlation coefficients of this field are significant at α=0.05, so it can be said that the paragraphs of this field are consistent and valid to be measure what it was set for.

3.15.3.1 Internal consistency for First field (Owner requirements)

Table (3.2) show the correlation coefficient between each paragraph in the field and the whole field. From the results of Table, it can be figured out that the questions are consistent and valid to measure what it were set for.

Table (3.2) First field: Owner requirements

No.	Items	Pearson coefficient	p-value
a)	**Factors related to the cost**		
1.	The existence of financial risk through the Implementation of the project has direct impact materials procurements in construction projects.	0.719	0.000
2.	Delays in the financing of the project may effect on procurements in construction projects.	0.618	0.000
3.	Accuracy during pricing may effect on procurements in construction projects.	0.574	0.000
4.	The existence of competition in the bidding negatively effect on the process of procurements in construction projects.	0.742	0.000
5.	The possibility of completing the project within the budget clearly effect on procurements in construction projects.	0.519	0.000
6.	The owner knowledge of materials in the market and construction industry may play a prominent role in the process of procurements in construction projects.	0.626	0.000
b)	**Factors related to the time**		
1.	The appropriateness of the project schedule the actual time may work on facilitates the procurements in construction projects.	0.733	0.000
2.	The ability to predict the obstacles may be reflected directly on the process of the procurements in construction projects.	0.744	0.000
3.	Predicting the actual project tasks time may improve the procurements in construction projects.	0.722	0.000
4.	Tasks execution time are effect on procurements in construction projects	0.718	0.000
c)	**Factors related to the quality**		
1.	Correct and suitable design is directly effect on procurements in construction projects	0.607	0.000
2.	Changes on architectural aspects by changing the owner's desire may effect on procurements in construction projects	0.487	0.000
3.	Existence of a clear in the management department of the project directly effect on procurements in construction projects	0.618	0.000
4.	Existence of a good relation and communication between members of the project team could facilitate the process	0.639	0.000

	procurements in construction projects.		
5.	Existence of a clear express of users' requirements may help on the process procurements in construction projects.	0.579	0.000
6.	Quality of work may effect on the process procurements in construction projects.	0.668	0.000
7.	Contractor Reputation effect on the process procurements in construction projects.	0.534	0.000
8.	Technical specification at end effect on the process procurements in construction projects.	0.635	0.000
9.	Level of expertise involved effect on the process procurements in construction projects.	0.557	0.000
10.	Safety during the project stages effect on the process procurements in construction projects.	0.577	0.000

3.15.3.2 Internal consistency for Second field (Project Characteristics)

Table (3.3) show the correlation coefficient between each paragraph in the field and the whole field. From the results of Table, it can be figured out that the questions are consistent and valid to measure what it were set for.

Table (3.3) Second field: Project Characteristics

No.	Items	Pearson coefficient	p-value
1.	Project Type may effect on procurements in construction projects.	0.564	0.000
2.	Project Size may effect on procurements in construction projects.	0.642	0.000
3.	Project Cost may effect on procurements in construction projects.	0.576	0.000
4.	Degree of Flexibility may effect on procurements in construction projects.	0.600	0.000
5.	Degree of complexity may effect on procurements in construction projects.	0.703	0.000
6.	Time constrains may effect on procurements in construction projects.	0.680	0.000
7.	Urgency of the owner to finish the project may effect on procurements in construction projects.	0.731	0.000
8.	Risks Allocation/Avoidance during the project may effect on procurements in construction projects.	0.573	0.000

No.	Items	Pearson coefficient	p-value
9.	Disputes and arbitration may effect on procurements in construction projects	0.589	0.000
10.	Teamwork during the project may effect on procurements in construction projects	0.655	0.000

3.15.3.3 Internal consistency for Third field (External Environment)

Table (3.4) show the correlation coefficient between each paragraph in the field and the whole field. From the results of Table, it can be figured out that the questions are consistent and valid to measure what it were set for.

Table (3.4) Third field: External Environment

No.	Items	Pearson coefficient	p-value
1.	Market's competitiveness directly effect on procurements in construction projects	0.608	0.000
2.	Government as a policy maker may effect on procurements in construction projects	0.706	0.000
3.	Government as a major client may effect on procurements in construction projects	0.640	0.000
4.	Regulatory Environment may effect on procurements in construction projects	0.622	0.000
5.	Economic condition of the country may effect on procurements in construction projects	0.541	0.000
6.	Information Technology may effect on procurements in construction projects	0.644	0.000
7.	Natural disaster may effect on procurements in construction projects	0.609	0.000
8.	Political Considerations may effect on procurements in construction projects	0.637	0.000
9.	Availability of the materials may effect on procurements in construction projects	0.634	0.000

3.15.3.4 Structure Validity of the Questionnaire

Structure validity is the second statistical 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 liker scale.

As shown in Table (3.5), the significance values are less than 0.05, so the correlation coefficients of all the fields are significant at $\alpha = 0.05$, so it can be said that the fields are valid to be measured what it was set for to achieve the main aim of the study.

Table (3.5) Structure Validity of the Questionnaire

Fields	Pearson correlation coefficient	p-value
Factors related to the cost	0.714	0.000
Factors related to the time	0.774	0.000
Factors related to the quality	0.803	0.000
Owner requirements	0.911	0.000
Project Characteristics	0.829	0.000
External Environment	0.801	0.000

From the Table's results, it can be figured out that the fields are valid to measure what they were set for to achieve the main aim of the study.

3.16 Reliability of the Research

Reliability is the degree of consistency or dependability with which an instrument (questionnaire for this study) measures what it is designed to measure. The test is doing by repeating the questionnaire to the same sample of the target group in a different time and comparing the scores that obtained in the first time and in the second time by computing a reliability coefficient. For the most purposes, it considered satisfactory if the reliability coefficient is above (0.7). A period from two weeks to a month is recommended for distributing the questionnaires for the second time (Field, 2009; Weiers, 2011; Garson, 2013). Due to the complicated conditions, it was too difficult to ask the same sample to respond to the same questionnaire twice within short period. Thus, to overcome the distribution of the questionnaire twice to measure the reliability, Half Split method and Cronbach's alpha coefficient test were used through the SPSS software to achieve that.

3.16.1 Half Split Method

This method depends on finding Pearson correlation coefficient between the means of odd rank questions and even rank questions of each field of the questionnaire. Then, correcting the Pearson correlation coefficients can be done by using Spearman Brown correlation coefficient of correction. The corrected correlation coefficient (consistency coefficient) is computed according to the following equation:

Consistency coefficient = 2r/(r+1), where r is the Pearson correlation coefficient. The normal range of corrected correlation coefficient 2r/(r+1) is between 0.0 and + 1.0 As shown in Table No.(3.6), all the corrected correlation coefficients values are between 0.706 and 0.899 and the general reliability for all items equal 0.940, and the significant (α) is less than 0.05 so all the corrected correlation coefficients are significance at α = 0.05. It can be said that according to the Half Split method, the dispute causes group are reliable.

Table (3.6): Split-Half Coefficient method

Fields	person correlation	Spearman-Brown Coefficient	Sig. (2-Tailed)
Factors related to the cost	0.504	0.706	0.000
Factors related to the time	0.549	0.709	0.000
Factors related to the quality	0.586	0.739	0.000
Owner requirements	0.816	0.899	0.000
Project Characteristics	0.700	0.824	0.000
External Environment	0.672	0.804	0.000
All items	0.887	0.940	0.000

3.16.2 Cronbach's Coefficient Alpha

This method is used to measure the reliability of the questionnaire between each field and the mean of the whole fields of the questionnaire. The normal range of Cronbach's coefficient alpha value between 0.0 and + 1.0, and the higher values reflects a higher degree of internal consistency. As shown in Table No. (3.7) the Cronbach's coefficient alpha was calculated and the results were in the range from 0.705 and 0.845, and the general reliability for all items equal 0.912, this range is considered high; the result ensures the reliability of the questionnaire.

Table (3.7): For Reliability Cronbach's Alpha

Fields	Cronbach's Alpha
Factors related to the cost	0.754
Factors related to the time	0.705
Factors related to the quality	0.762

Fields	Cronbach's Alpha
Owner requirements	0.845
Project Characteristics	0.830
External Environment	0.782
All items	0.912

As shown above, results of the statistical validity of the questionnaire (the internal and the structure of the questionnaire) as well as results of reliability tests (Half Split method and the Cronbach's coefficient Alpha method) showed the success of the tests and thus the success of the questionnaire (valid and reliable).

3.17 Final amendment to the questionnaire

After piloting, the questionnaire was adopted and distributed to the whole sample. Each field was simple and short to improve response rates (Dillman et al., 2000). And as mentioned above, the questionnaire was provided with a covering letter explaining the aim of the research, the security of the information in order to encourage a high response, and the way of responding. The original questionnaire was developed in English language. English language questionnaire is attached in (Appendix A). Based on the belief of the researcher that the questionnaire would be more effective and easier to be understood for all respondents if it is in Arabic (native language) and thus get more realistic results, the questionnaire (after final adoption) was translated in Arabic language, which is attached in (Appendix B).

3.18 Questionnaire distribution and collection

To facilitate the data distribution and collection the questionnaire was distributed in two ways:

- Electronic way via Email, Facebook and other means of communications.
- Printed and hand delivered way.

To overcome the risk of not responding, the questionnaire was distributed to a number higher than the calculated sample size. Fortunately, the response rate was very high which the returned number of respondents was 92 out of 102 with response rate equal to 90.19%.

3.19 Measurements

Analysis of the data was undertaken using IBM SPSS Statistics (Statistical Package for the Social Sciences) Version 22(IBM). The following quantitative measures were used for the data analysis:

A. Descriptive Statistics (Naoum, 2007; Salkind, 2010):
   1. Frequencies and Percentile.
   2. measures of central tendency (the mean)
   3. Measurement of dispersion based on the mean (standard deviation)
   4. Relative Important Index (RII)
   5. Factor analysis
   6. Normal distribution (depends on *central limit theorem*)
   7. Homogeneity of variances (Homoscedasticity)

B. The inferential statistics (bivariate) / test of hypotheses (Naoum, 2007; Salkind, 2010):
   1. Cross-tabulation analysis
   2. Pearson product-moment correlation coefficient/ Pearson's correlation coefficient (a parametric test)
   3. The sample independent t-test to find out whether there is a significant difference in the mean between two groups (a parametric test)
   4. Analysis of Variance (One way ANOVA) test (a parametric test)
   5. Scheffé's method for multiple comparisons

To present the results, the following tools have been used: tabulation, bar chart, pie chart, and graph.

3.19.1 Cross-tabulation analysis

In statistics, a cross tabulation (crosstab) is a type of Table in a matrix format that displays the (multivariate) frequency distribution of the variables. They are heavily used in survey research, business intelligence, engineering and scientific research. They provide a basic picture of the interrelation between two variables and can help find interactions between them. In other words, cross tabulation is a tool that allows researcher to compare the relationship between two variables.

3.19.2 Calculating of Relative Importance Index (RII) of Factors

The relative importance index method (RII) was used to determine the ranks of items/ variables as perceived by the respondents in each of part 2, part 3, part 4, and part 5. The relative importance index was computed as (Sambasivan and Soon, 2007; Field, 2009):

$$RII = \Sigma W / (A * N)$$

Where:
W = the weighting given to each factor by the respondents (ranging from 1 to 5)
A = the highest weight (i.e. 5 in this case)
N = the total number of respondents

The RII value had a range from 0 to 1 (0 not inclusive), the higher the value of RII, the more impact of the attribute. However, RII doesn't reflect the relationship between the various items.

As such analysis does not provide any meaningful outcomes in terms of understanding the clustering effects of the similar items and the predictive capacity, further analysis is required using advanced statistical methods. Factor analysis was used to reduce the items and investigating the clustering effects.

3.19.3 Parametric tests

Parametric test: a test that requires data from one of the large catalogue of distributions that statisticians have described. Normally this term is used for parametric tests based on the normal distribution, which require four basic assumptions that must be met for the test to be accurate: a normally distributed sampling distribution (researcher can approximate using a normal distribution after invoking the *central limit theorem*), homogeneity of variance, interval or ratio data, and independence (Field, 2009; Weiers, 2011).

3.19.3.1 Pearson product-moment correlation coefficient/ Pearson's correlation coefficient

Correlation refers to any of a broad class of statistical relationships involving dependence. The most familiar measure of dependence between two quantities (two sets of data or two variables) is the *Pearson product-moment correlation coefficient*, or "*Pearson's correlation coefficient*", commonly called simply "*the correlation coefficient*". It shows the linear relationship between two sets of data. Two letters are used to represent the Pearson correlation: Greek letter rho (ρ) for a population and the letter (r) for a sample (Filed, 2009; Treiman, 2009).

The Pearson's product-moment coefficient measures the strength and direction of the relationship between two quantitative variables. It is used to measure the strength of a linear association between two variables, where the value $r = 1$ means a perfect positive correlation and the value $r = -1$ means a perfect negative correlation. The sign of (r) denotes the nature of the relationship, while the value of (r) denotes the strength of relationship (Filed, 2009; Treiman, 2009).

Requirements to apply the test

- Scale of measurement should be interval or ratio
- Variables should be approximately normally distributed
- The association should be linear
- There should be no outliers in the data

3.19.3.2 Sample Independent t-test

The *t*-test is a parametric test which helps the researcher to compare whether two groups have different average (mean) values (for example, whether men and women have different

average heights). According to the data gathered, the critical value of t = 1.98, where the degree of freedom (df) = [N-2] = [102-2] = 100 (N is the sample size) at significance (probability) level (α) = 0.05 (Field, 2009; Weiers, 2011).

3.19.3.3 One way ANOVA (F-test)

One-way analysis of variance (abbreviated one-way ANOVA) provides a parametric statistical test of whether or not the means of several groups are equal (by using the F-ratio), and therefore generalizes the t-test to more than two groups. Critical value of F: at degree of freedom (df) = [(K-1), (N-K)] at significance (probability) level (α) = 0.05 (Field, 2009; Weiers, 2011).

3.19.3.4 Scheffé's method (Multiple-Comparison procedure)

In statistics, Scheffé's method, named after the American statistician Henry Scheffé, is a method for adjusting significance levels in a linear regression analysis to account for multiple comparisons. It is particularly useful in ANOVA (a special case of regression analysis), and in constructing simultaneous confidence bands for regressions involving basis functions (Field, 2009; Weiers, 2011).

3.20 Summary

This chapter described the detailed adopted methodology of research. It included the primary design for the research, details of research location, target population, sample size, and response rate. The questionnaire design was detailed including the types of questions, question format, the sequence of questions, and the covering letter. Face validity, pre-testing the questionnaire, and pilot study were three main steps that were used to reach to the final amendment of the questionnaire. They all have been illustrated through this chapter. Quantitative data analysis techniques, which include Relative important index, Factor analysis, Pearson correlation analysis, and others, were adopted to be applied by the instruments of SPSS. For the purposes of testing the research validity, reliability, and adequacy of methods used in analysis, different statistical tests were used and explained in details. The following Table (3.8) summarized the method chart.

Table (3.8): Method chart

Methodology	Purpose	Outcome
Proposal	• Identify the problem • Define the problem • Establish aim and objectives, • Develop research plan/strategy (outline methodology) by deciding on the	• Research problem Inappropriate procurement method would yield unsatisfactory results in terms of time, cost and quality from the client's perspective. Moreover, it would lead to disputes and allegations between parties. • Research Aim

Methodology	Purpose	Outcome
	research technique.	To provide a platform of knowledge for the construction management practitioners about the factors affecting the selection of procurement management system in the construction industry in Gaza Strip. • Research Objectives 1. To review procurement management system. 2. To assess the impacts of procurement management system on the construction projects. 3. To compile a list of the different factors affecting the selection of procurement management system. And stating the most important factors. 4. To identify the most common factors affecting on the procurement system in Gaza strip. • Research plan/strategy The research approach is quantitative survey research to measure objectives (descriptive survey and analytical survey). • The research technique is questionnaire.
Literature Review	• Collecting existing knowledge on the subject, reading and note-taking from different sources.	• All factors have been compiled and summarized from the previous studies.
Questionnaire design	• Questionnaires have been widely used for descriptive and analytical surveys in order to find out facts, opinions and views on what is happening, who, where, how many or how much. • Identify: • types of questions, • question format, • the sequence of questions, and	• Types of questions: Closed ended (multiple choice) questions and ranking the importance of factors. • Question format: • Numerical rating scale The numerical rating scale (rating out of 5) was chosen to format the questions of the questionnaire with some common sets of response categories called quantifiers (they reflect the intensity of the particular judgment involved). Those quantifiers were used to facilitate understanding • The sequence of questions. The content of the questionnaire verified the

Methodology	Purpose	Outcome
	• the covering letter	objectives in this research as follows: ✓ Part one: *is related to the respondent's personal information and Biography of the company.* ✓ Part one: *is related to the procedures and policies in Supply Management in construction projects.* • The covering letter The questionnaire was provided with a covering letter explaining the aim of the research, the security of the information in order to encourage a high response, and the way of responding.
Face validity	• See whether the measurement procedure (the questionnaire) in the study appears to be a valid or not. It done through face validity, which is a "common-sense"	• The questionnaire was presented to 6 experts (from Gaza and outside Palestine) by hand and by email at different periods. • Many useful and important modifications have been made for the questionnaire.
Pre-testing the questionnaire	• To make sure that the questionnaire is going to deliver the right data and to ensure the quality of the collected data. • To find out if the survey has any logic problems, if the questions are too hard to understand, if the wording of the questions is ambiguous, or if it has any response bias, etc.	• The pre-testing was conducted in two phases and each phase has been tested with 3 people. • The first phase of the pre-testing resulted with some amendments to the wording of some words in the questions, in addition to add further explanation to some factors to facilitate the understanding of the questionnaire. • The second phase was sufficient to ensure the success of the questionnaire, where there were not any queries and everything was clear.
Pilot study	• A trial run on the questionnaire before circulating it to the whole sample in order to get valuable responses and to detect areas of possible shortcomings.	• The questionnaire were distributed to respondents from the target group (professionals in the procurement managements in Gaza strip). • All the copies were collected and analyzed through Statistical Package for the Social Sciences IBM (SPSS) version 22. • The tests that have conducted were as follows : 1. The statistical validity of the questionnaire /

Methodology	Purpose	Outcome
	• Questions that are not providing useful data are discarded, and the final revisions of the questionnaire are made.	criterion related validity (internal and structure validity). 2. The reliability of the questionnaire by Half Split method and the Cronbach's Coefficient Alpha method. • The results showed the success of the tests and thus the success of the questionnaire. • The questionnaire was adopted and was distributed to the whole sample.
Sampling the questionnaire	• Identify the population from which the sample is to be drawn, where the term "sample" means a specimen or part of a whole(population) which is drawn to show what the rest is like	• The type of the sample : ▪ Convenience sample was chosen as the type of sample, where convenience sampling is a non-probability sampling technique. • The population ▪ The population included the professionals in the construction industry in Gaza strip. • Size sample ▪ 102 copies of the questionnaire were distributed and 92 copies of the questionnaire were received from the respondents. Thus, the whole sample was 92 (the successful sample of pilot study was included, which equals 6). • Response rate ▪ (92/102)*100 = 90.2 %
Analysis and Presentation of the Results	• Analyze the results of the collected data to determine the direction of the study • Choose the analysis instrument • Identify the method of the analysis • Present the results	• Analysis instrument ▪ IBM (SPSS) version 22 • Method of analysis ▪ Quantitative analysis of data by converting the ordinal data to scale data. • The quantitative measures/analysis A. Descriptive Statistics: a. Frequencies and Percentile (results can be presented in the form of tabulation, a bar chart, a pie chart or a graph). b. measures of central tendency (The mean) c. Measurement of dispersion based on the mean (standard deviation) d. Relative Important Index (RII) e. Factor analysis f. Normal distribution (depends on *central limit theorem*) B. The inferential statistics (bivariate) / test

Methodology	Purpose	Outcome
		of hypotheses: 1. Cross-tabulation analysis 2. Pearson product-moment correlation coefficient/ Pearson's correlation coefficient)a parametric test 3. The sample independent t-test to find out whether there is a significant difference in the mean between two groups (a parametric test) 4. Analysis of Variance (One way ANOVA) test (a parametric test) 5. Scheffé's method for multiple comparisons

Chapter 4

Chapter 4: Results and discussion

4.1 Introduction

Chapter four exclusively focuses on the adopted statistically analysis tests for the collected data in addition to its discussion. The first part will focus on the results of background and assessment information. Thus the results and discussion will focus on the other parts which are related to the impacts of applying procurement management on the construction projects.

The chapter will also present the tests that are responsible for measuring the differences in responses according to the independent factors.

A total of 92 completed copies had been returned, representing a valid response rate of 90.2 %. Data were analyzed quantitatively using IBM (SPSS) version 22 including descriptive and inferential statistical tools. This chapter included the respondents' profiles, quantitative analysis of the questionnaire, and finally the results.

4.2 Organizational profiles

This part aims at assessing the general information about organizations due to different five questions. The questions in this part were about the organization age, organization size, Company field of work, Company rating by the Union Contractors and Size of the construction projects you worked in for the last three years. The following illustrates the respondents' distribution over the five questions.

4.2.1 Organization Age:

The results show the organization age as show in Table (4.1), the organization age Less than 3 years in the sample are 20.7% , the organization age Less than 10 years in the sample are 18.5% , while the organization age Less than 20 years in the sample are 28.3% and the organization age more than 20 years in the sample are 32.6% . As the major percentage of the organization age are related to over twenty years, this give a good indicator that the respondents will be expected to add some values to research.

Table (4.1): Organization Age

General information about organizations	Categories	Frequency	Percentage
organization age	Less than 3 years	19	20.7%
	Less than 10 years	17	18.5%
	Less than 20 years	26	28.3%
	more than 20 years	30	32.6%

4.2.2 Organization size

For the organization size, the results in Table (4.2) show the organization size, the organization size of "1-4 employee" in the sample are 10.9% , while the organization size of "5-19 employee" in the sample are 43.5% but the organization size of "20-49 employee" in the sample are 12.0% and the organization size of organizations have more than 50 employee in the sample are 33.7%. As the major percentage of the organization size are related to the organizations that have more number of employee between 5 and 19 employee , this give a good indicator that the respondents have a good accuracy.

Table (4.2): Organization size

General information about organizations	Categories	Frequency	Percentage
Organization size	1-4 employee	10	10.9%
	5-19 employee	40	43.5%
	20-49 employee	11	12.0%
	more than 50 employee	31	33.7%

4.2.3 Company field of work

The results show the Company field of work as show in Table (4.3), Building category have 69.6% which is the major percentage categories, water and sewage category is only 8.7% while the road category is about 9.8%, finally the public works and maintenance category is 12.0%. the result show that the contractors are interested in building category.

Table (4.3): Company field of work

General information about organizations	Categories	Frequency	Percentage
Company field of work	Building	64	69.6%
	Water and sewage	8	8.7%
	Road	9	9.8%
	Public works and maintenance	11	12.0%

4.2.4 Organization size

For the company classifications by the contractors union, the results in Table (4.4) show Company classifications by the contractors union, the first class organization in the sample are 70.7% , while the second class organization in the sample is 16.3% but the third class in the sample are 13.0%. As the major percentage of Company classifications are related to

the first class, this give a good indicator that the respondents will also be expected to add some values to research.

Table (4.4): Company classifications by the contractors union

General information about organizations	Categories	Frequency	Percentage
Company classifications by the contractors union	First class	65	70.7%
	Second class	15	16.3%
	Third class	12	13.0%

4.2.5 Size of the construction projects done for the last three years

For the size of the construction projects done for the last three years, the results in Table (4.5) show the size of the construction projects done for the last three years, the percentage of the companies that have a project volume less than 0.5 million $ in the sample is 22.8%, the percentage of the companies that have a project volume between 0.5-1 million $ in the sample is 9.8%, while the percentage of the companies that have a project volume between 1-3 millions $ in the sample is 18.5% and the percentage of the companies that have a project volume more than three million $ in the sample is 48.9% which is the major percentage of construction projects volume done for the last three years, this give a good indicator that the respondents have a good experience on the market.

Table (4.5): Size of the construction projects done for the last three years

General information about organizations	Categories	Frequency	Percentage
Size of the construction projects done for the last three years	Less than 0.5 million $	21	22.8%
	0.5-1 million $	9	9.8%
	1 - 3 millions $	17	18.5%
	More than 3 million $	45	48.9%

4.3 General information about respondents

This part aims at assessing the profile of respondents due to different six questions. The questions in this part were about the Gender, Specialization, Educational qualification, Age, Years of experience and Work position. Table 4.1 illustrates the respondents' distribution over the six questions.

4.3.1 Gender

The results show that the male respondents in the sample are 97.8% and the female respondents in the sample are 2.2% as shown in Table (4.6).

Table (4.6): Respondents gender

General information about respondents	Categories	Frequency	Percentage
Gender	Male	90	97.8%
	Female	2	2.2%

4.3.2 Specialization

For the Specialization results, Civil engineers are 87.0%, Architect engineers are 6.5%, Mechanical engineers are 0.00% and Electrical engineers are 6.5% as shown in Table (4.7).

Table (4.7): Respondents specialization

General information about respondents	Categories	Frequency	Percentage
Specialization	Civil	80	87.0%
	Architect	6	6.5%
	Mechanical	-	-
	Electrical	6	6.5%

4.3.3 Highest earned degree

The results show that the diploma degree respondents in the sample are 4.3%, the bachelor degree respondents are 58.7%, the master degree respondents are 32.6% and 4.3% for the Ph.D. level respondents. This indicates that the responses are restricted between two types of educational level represented by bachelor and master degrees as shown in Table (4.8).

Table (4.8): Respondents highest earned degree

General information about respondents	Categories	Frequency	Percentage
Highest earned degree	Diploma	4	4.3%
	Bachelor's	54	58.7%
	Master's	30	32.6%
	Ph.D.	4	4.3%

4.3.4 Age

For the age results, 6.5% of the results are Less than 25 years, 71.7% of the results are Less than 35 years, 13.0% of the results are Less than 45 years and 8.7% of the results are more than 45 years as shown in able (4.9).

Table (4.9): respondents age

General information about respondents	Categories	Frequency	Percentage
Age	Less than 25 years	6	6.5%
	Less than 35 years	66	71.7%
	Less than 45 years	12	13.0%
	More than 45 years	8	8.7%

4.3.5 Years of experience

For the years of experience, 10.9% of respondents are Less than 1 year, 50.0% of respondents are Less than 5 years, 25.0% of respondents are Less than 15 years and the respondents with over 15 years are 14.1%. As the major percentage of the years of experience are around 5 years, this give a good indicator that the respondents will be expected to add some values to research as shown in able (4.10).

Table (4.10): respondents years of experience

General information about respondents	Categories	Frequency	Percentage
Years of experience	Less than 1 year	10	10.9%
	Less than 5 years	46	50.0%
	Less than 15 years	23	25.0%
	More than 15 years	13	14.1%

4.3.6 Work position

For the work position results, Table 4.1 shows that Company manager are 17.4 %, Project manager are 14.1 %, Site engineer are 42.4 % and the office engineer are 26.1 %. The variety of work positions will be expected to enrich the research with different views and responses as shown in Table (4.11).

Table (4.11): respondents work position

General information about respondents	Categories	Frequency	Percentage
Work position	Company manager	16	17.4%
	Project manager	13	14.1%
	Site engineer	39	42.4%
	Office engineer	24	26.1%

4.4 Means, Ranks and Relative importance Index (RII)

The mean values were used in this study to rank the factors according to the agreement level of respondents about each factor. The factors were ranked due to its mean value in its

section and also due to the whole part. Likert scale was used for ranking factors that have an agreement levels. The respondents were asked to give their perceptions in group of factors on five-point scale (1 for the strongly disagree, 2 for disagree, 3 for neutral, 4 for agree and 5 for strongly agree).

To determine the relative ranking of the factors, these scores were then transformed to importance indices based on the formula:

4.4.1 Relative importance Index (RII).

Descriptive statistics namely relative importance index method (RII) was used to determine the ranks of all performance factors and to highlight the relative importance of attributes as perceived by the respondents (Assaf et al., 1995; Faridi &El-Sayegh, 2006). The relative importance index was computed as (Sambasivan & Soon, 2007):

Formula Relative importance Index = $$\frac{\sum w}{AN} = \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + 1n_1}{5N}$$

Where W is the weighting given to each factor by the respondent, ranging from 1 to 5 ,(n5 = number of respondents for Very High Important, n4 = number of respondents for High Important, n3 = number of respondents for Medium important , n2 = number of respondents for Low important , n1 = number of respondents for Very low important). A is the highest weight (i.e 5 in the study) and N is the total number of samples. The relative importance index ranges from 0 to 1. Tables below show the relative importance index of each clause.

4.4.1.1 Factors related to cost

We calculate the Relative Importance Index for each factor to test the opinion of the respondents about (Factors related to the cost), and the results shown in Table No. (4.17) Ranking from the most important to lowest important. These results indicate that the cost of the project is most sensible in the delays factor which my occur in the project financing and also effect on the procurements in construction projects which is have the relative importance index equal "82.39%". In same time the accuracy during pricing factor which have a relative importance index equal "78.26%" also have an importance on the cost of the constructions project.

While the existence of competition in the bidding factor which have a relative importance index equal "53.70%" was not have the same importance like the other factors from the respondents point of view. Because the materials in the local market have a cleat price list and all the contractors could have the same prices as the others.

For general the results for all items of the field (Factors related to the cost) show that the average mean equal "3.65" and the Relative importance Index equal "73.00%" which is greater than "60.0%" and the value of t test equal "10.588" which is greater than the critical

value which is equal 1.98 and the p- value equal 0.000 which is less than 0.05 that means "Factors related to the cost is high important".

Table (4.17): Factors related to cost

Statement	Mean	SD	RII (%)	t-value	P-value	Rank
Delays in the financing of the project may effect on procurements in construction projects.	4.12	1.015	82.39	10.584	0.000	1
Accuracy during pricing may effect on procurements in construction projects.	3.91	0.968	78.26	9.045	0.000	2
The owner knowledge of materials in the market and construction industry may play a prominent role in the process of procurements in construction projects.	3.86	1.154	77.17	7.138	0.000	3
The existence of financial risk through the Implementation of the project has a direct impact materials procurements in construction projects.	3.85	1.204	76.96	6.755	0.000	4
The possibility of completing the project within the budget clearly effect on procurements in construction projects.	3.47	0.988	69.35	4.536	0.000	5
The existence of competition in the bidding negatively effect on the process of procurements in construction projects.	2.68	0.983	53.70	-3.077	0.003	6
All items	3.65	0.588	73.00	10.588	0.000	

4.4.1.2 Factors related to the project duration

We calculate the Relative importance Index for each factor to test the opinion of the respondent about (Factors related to the time), and the results shown in Table No. (4.18) ranking from the most important to lowest important as follows:

This rank indicates that the duration of the project is most sensible in the predicting the actual project tasks time factor which effect on the procurements in construction projects that is have the relative importance index equal "81.00%". In same time the Tasks

execution time factor which have a relative importance index equal "80.87%" also have an importance on the duration of the constructions project.

While the ability to predict the obstacles factor which have a relative importance index equal "72.83%" was not have the same importance like the others from the respondents point of view. It was clear because there is not direct relation between ability to predict the obstacles and the procurements in the construction industry in Gaza strip.

For general the results for all items of the field (Factors related to the time) show that the average mean equal "3.87" and the Relative importance Index equal "77.39%" which is greater than "60.0%" and the value of t test equal "10.975" which is greater than the critical value which is equal 1.98 and the p- value equal 0.000 which is less than 0.05 that means "Factors related to the time is high important".

Table (4.18): Factors related to project duration

Statement	Mean	SD	RII (%)	t-value	P-value	Rank
predicting the actual project tasks time may improve the procurements in construction projects.	4.05	0.982	81.00	10.188	0.000	1
Tasks execution time are effect on procurements in construction projects	4.04	1.099	80.87	9.111	0.000	2
The appropriateness of the project schedule the actual time may work on facilitates the procurements in construction projects.	3.75	1.055	75.00	6.820	0.000	3
The ability to predict the obstacles may be reflected directly on the process of the procurements in construction projects.	3.64	1.033	72.83	5.953	0.000	4
All items	3.87	0.760	77.39	10.975	0.000	

4.4.1.3 Factors related to the quality

We calculate the Relative importance Index for each factor to test the opinion of the respondent about (Factors related to the quality), and the results shown in Table No. (4.19) ranking from the most important to lowest important as follows:

The top significant factor related to the quality was about contractor reputation factor which is have the relative importance index equal "82.61%", This is a normal reflection to the local situation in Gaza strip. Because the suppliers always looking for the contractors who have a good reputations to deal with. And he contractors who have a good reputations can have a good prices and a good payment procedure with the suppliers.

In the other hand safety during the project stages factor which have a relative importance index equal "60.20%" was not have the same importance like the others from the respondents point of view. Because there is no a direct relations between the safety during the constructions project and the procurements managements.

For general the results for all items of the field (Factors related to the quality) show that the average mean equal "3.57" and the Relative importance Index equal "71.48%" which is greater than "60.0%" and the value of t test equal "9.469" which is greater than the critical value which is equal 1.98 and the p- value equal 0.000 which is less than 0.05 that means "Factors related to the quality is high important".

Table (4.19): Factors related to the quality

Statement	Mean	SD	RII (%)	t-value	P-value	Rank
Contractor reputation effect on the process procurements in construction projects.	4.13	0.952	82.61	11.392	0.000	1
Technical specification at end effect on the process procurements in construction projects.	4.01	0.908	80.22	10.681	0.000	2
Level of expertise involved effect on the process procurements in construction projects.	3.93	1.003	78.70	8.936	0.000	3
Correct and suitable design is directly effect on procurements in construction projects	3.52	1.104	70.43	4.532	0.000	4
Existence of a clear in the management department of the project directly effect on procurements in construction projects	3.51	0.955	70.22	5.131	0.000	5
Changes on architectural aspects by changing the owner's desire may effect on procurements in construction projects	3.49	0.989	69.78	4.744	0.000	6
Quality of work may effect on the process procurements in construction projects.	3.46	0.999	69.20	4.281	0.000	7
Existence of a clear express of users' requirements may help on the process procurements in construction projects.	3.45	0.965	68.91	4.430	0.000	9
Existence of a good relation and communication between members of the project team could facilitate the process procurements in construction projects.	3.25	1.154	65.00	2.077	0.041	9

Statement	Mean	SD	RII (%)	t-value	P-value	Rank
Safety during the project stages effect on the process procurements in construction projects.	3.01	1.231	60.20	0.004	0.998	10
All items	3.57	0.581	71.48	9.469	0.000	

4.4.1.4 Project Characteristics

We calculate the Relative importance Index for each factor to test the opinion of the respondent about (Project Characteristics), and the results shown in Table No. (4.20) ranking from the most important to lowest important as follows:

The top significant factor related to the project characteristics was about Project Size factor which is have the relative importance index equal "76.74%", This rank indicates the importance of the size of the project, because the size of the project is directly effect on the procurement procedures and the relation between the suppliers and the contractors will be sensible due to the volume of the project. In the same side, project type factor which have the relative importance index equal "73.80%", has also its importance in the procurements managements due to the characteristics of each project type.

In the other hand disputes and arbitration factor during the project stages which have a relative importance index equal "63.48%" does not have the same importance like the others from the respondents point of view. And it was clear, because disputes and arbitration does not effect on the procurements procedures any time.

For general the results for all items of the field (Project Characteristics) show that the average mean equal "3.51" and the Relative importance Index equal "70.20%" which is greater than "60.0%" and the value of t test equal "7.058" which is greater than the critical value which is equal 1.98 and the p- value equal 0.000 which is less than 0.05 that means "Project Characteristics is high important".

Table (4.20): Project Characteristics

Statement	Mean	SD	RII (%)	t-value	P-value	Rank
Project Size may effect on procurements in construction projects.	3.84	1.102	76.74	7.283	0.000	1
Project Type may effect on procurements in construction projects.	3.69	0.983	73.80	6.685	0.000	2
Time constrains may effect on procurements in construction projects.	3.68	1.128	73.70	5.821	0.000	3
Degree of complexity may effect on procurements in construction projects.	3.65	1.023	73.00	6.015	0.000	4
Urgency of the owner to finish the project may effect on procurements in construction	3.64	1.044	72.83	5.893	0.000	5

Statement	Mean	SD	RII (%)	t-value	P-value	Rank
projects.						
Project Cost may effect on procurements in construction projects.	3.51	1.022	70.22	4.796	0.000	6
Teamwork during the project may effect on procurements in construction projects	3.35	1.270	66.96	2.626	0.010	7
Degree of Flexibility may effect on procurements in construction projects.	3.34	0.986	66.74	3.276	0.001	8
Risks Allocation/Avoidance during the project may effect on procurements in .construction projects	3.21	1.075	64.13	1.843	0.069	9
Disputes and arbitration may effect on procurements in construction projects	3.17	1.263	63.48	1.320	0.190	10
All items	3.51	0.688	70.20	7.058	0.000	

4.4.1.5 External Environment

We calculate the Relative importance Index for each factor to test the opinion of the respondent about (External Environment), and the results shown in Table No. (4.21) ranking from the most important to lowest important as follows:

This rank indicates that the availability of the materials factor is most sensible on procurements in construction projects which have the relative importance index equal "84.13%". and this is a realistic results in the location of the research in Gaza strip, because of the limitations on the materials and the closures during the date of the research that Israel government apply on Gaza strip. In same time the political considerations factor which have a relative importance index equal "82.17%" also have an importance on the procurements in the project during the constructions project.

While the regulatory environment factor which have a relative importance index equal "68.04%" was not have the same importance like the others from the respondents point of view. It was clear because it is not have a direct effect between the regulatory environment and the procurements in the construction industry in Gaza strip.

For general the results for all items of the field (External Environment) show that the average mean equal "3.87" and the Relative importance Index equal "77.40%" which is greater than "60.0%" and the value of t test equal "12.996" which is greater than the critical value which is equal 1.98 and the p- value equal 0.000 which is less than 0.05 that means "External Environment is high important".

Table (4.21): External environment

Statement	Mean	SD	RII (%)	t-value	P-value	Rank
Availability of the materials may effect on procurements in construction projects	4.21	1.105	84.13	10.475	0.000	1
Political Considerations may effect on procurements in construction projects	4.11	1.021	82.17	10.413	0.000	2
Economic condition of the country may effect on procurements in construction projects	3.96	1.157	79.13	7.929	0.000	3
Government as a policy maker may effect on procurements in construction projects	3.92	1.082	78.48	8.193	0.000	4
Market's competitiveness directly effect on procurements in construction projects	3.90	1.049	78.04	8.250	0.000	5
Natural disaster may effect on procurements in construction projects	3.89	1.059	77.80	8.169	0.000	6
Government as a major client may effect on procurements in construction projects	3.83	1.085	76.52	7.300	0.000	7
Information Technology may effect on procurements in construction projects	3.63	1.056	72.61	5.727	0.000	8
Regulatory Environment may effect on procurements in construction projects	3.40	0.984	68.04	3.920	0.000	9
All items	3.87	0.644	77.40	12.996	0.000	

There is a statistically significant differences attributed to the personal information of the respondents at the level of $\alpha \leq 0.05$ about Procurement management in the construction industry.

There is a statistically significant differences at the level of $\alpha \leq 0.05$ about Procurement management in the construction industry refer to gender.

To test the hypothesis we use the Independent Samples Test and the result illustrated in Table no.(4.22) Which show that the p-value equal 0.723 which is greater than 0.05 and the absolute value of T test equal 0.355 which is less than the value of critical value which is equal 1.98, that's There is no statistically significant differences at the level of $\alpha \leq 0.05$ about Procurement management in the construction industry refer to gender.

4.5 One sample t test

was used to determine if the mean of a paragraph was significantly different from a hypothesized value 3 (Middle value of Likert scale). If the P-value (Sig.) is smaller than or equal to the level of significance,$\alpha = 0.05$ then the mean of a paragraph was significantly different from a hypothesized value 3. The sign of the Test value indicates whether the mean is significantly greater or smaller than hypothesized value 3. On the other hand, if the P-value (Sig.) is greater than the level of significance, $\alpha=0.05$, then the mean a paragraph is insignificantly different from a hypothesized value 3.

4.6 One way ANOVA test

Test was used to examine if there was a statistical significant difference between several means among the respondents toward procedures and policies in Supply Management in construction projects.

4.6.1 Difference of responses due to the gender

This part aims at assessing if there are significant differences in responses due to the gender. The independent samples-T test was used to check the differences due to the h gender where the responses limited in two answers which are the male and female.

To test the hypothesis we use the Independent Samples Test and the result illustrated in Table (4.22) Which show that the p-value equal 0.723 which is greater than 0.05 and the absolute value of T test equal 0.355 which is less than the value of critical value which is equal 1.98, that's There is no statistically significant differences at the level of $\alpha \leq 0.05$ about Procurement management in the construction industry refer to gender.

Table (4.22): Results of Sample Independent t-test regarding the gender of the respondents

Field	T- test	P-value	Mean	
			Male	female
Factors related to the cost	2.427	0.017	3.65	3.50
Factors related to the time	-2.170	0.033	3.84	5.00
Factors related to the quality	-0.309	0.758	3.57	3.70
Owner requirements	-0.666	0.507	3.65	3.90
Project Characteristics	-0.400	0.690	3.50	3.70
External Environment	0.456	0.649	3.88	3.67
All fields	-0.355	0.723	3.66	3.79
Critical value of t at df "90" and significance level 0.05 equal 1.98				

Thus, there are no statistically significant differences attributed to the gender of the respondents at the level of $\alpha \leq 0.05$ between the means of their views on the Procurement management in the construction industry.

4.6.2 Difference of responses due to the specialization

This part aims at assessing if there are significant differences in responses due to the specialization. The independent samples-T test was used to check the differences due to the specialization where the responses limited in four answers which are (Architect, Civil, Electrical and Mechanical).

To test the hypothesis we use the one way ANOVA and the result illustrated in Table (4.23) which show that the p-value equal 0.818 which is greater than 0.05 , and the value of Fstat = 0.387 which is smaller than Fcritical = 2.71, that's means there is no statistically significant difference at level of $\alpha \leq 0.05$ about Procurement management in the construction industry refer to specialization.

Table (4.23): One way ANOVA results regarding the specialization of the respondents

Field	**F-test**	**P-value**	Mean			
			Civil	Architect	Mechanical	Electrical
Factors related to the cost	0.654	0.522	3.65	3.83	3.44	3.65
Factors related to the time	0.377	0.687	3.86	4.13	3.79	3.87
Factors related to the quality	0.122	0.885	3.58	3.65	3.48	3.57
Owner requirements	0.387	0.680	3.65	3.80	3.53	3.66
Project Characteristics	0.313	0.732	3.51	3.67	3.35	3.51
External Environment	0.099	0.906	3.88	3.76	3.89	3.87
All fields	0.201	0.818	3.67	3.76	3.57	3.67
Critical value of F at df "3,88" and significance level 0.05 equal 2.71						

Thus, there are no statistically significant differences attributed to the specialization of the respondents at the level of $\alpha \leq 0.05$ between the means of their views on the Procurement management in the construction industry.

4.6.3 Difference of responses due to the educational qualification

This part aims at assessing if there are significant differences in responses due to the educational qualification. The independent samples-T test was used to check the differences due to the educational qualification where the responses limited in four answers which are (Diploma, Bachelor's, Master's and Ph.D).

To test the hypothesis we use the one way ANOVA and the result illustrated in Table (4.24) which show that the p-value equal 0.818 which is greater than 0.05 , and the value of Fstat = 0.405 which is smaller than Fcritical = 2.71, that's means there is no statistically significant difference at level of $\alpha \leq 0.05$ about Procurement management in the construction industry refer to educational qualification.

Table (4.24): One way ANOVA results regarding the educational qualification of the respondents

Field	F- test	P-value	Mean			
			Diploma	Bachelor's	Master's	Ph.D
Factors related to the cost	1.281	0.286	4.00	3.67	3.62	3.21
Factors related to the time	0.999	0.397	3.81	3.96	3.78	3.38
Factors related to the quality	0.402	0.752	3.50	3.58	3.61	3.28
Owner requirements	0.776	0.510	3.71	3.69	3.65	3.28
Project Characteristics	0.585	0.627	3.18	3.53	3.55	3.23
External Environment	0.497	0.685	3.89	3.93	3.76	3.97
All fields	0.405	0.750	3.62	3.70	3.65	3.42
Critical value of F at df "3,88" and significance level 0.05 equal 2.71						

Thus, there are no statistically significant differences attributed to the educational qualification of the respondents at the level of $\alpha \leq 0.05$ between the means of their views on the Procurement management in the construction industry.

4.6.4 Difference of responses due to the age of the respondents

This part aims at assessing if there are significant differences in responses due to the age. The independent samples-T test was used to check the differences due to the age where the responses limited in four answers which are (Less than 25 years, Less than 35 years, Less than 45 years and more than 45 years).

To test the hypothesis we use the one way ANOVA and the result illustrated in Table (4.25) which show that the p-value equal 0.735 which is greater than 0.05 , and the value of Fstat

= 0.426 which is smaller than Fcritical = 2.71, that's means there is no statistically significant difference at level of $\alpha \leq 0.05$ about Procurement management in the construction industry refer to age.

Table (4.25): One way ANOVA results regarding the age of the respondents

Field	F-test	P-value	Mean			
			Less than 25 years	Less than 35 years	Less than 45 years	more than 45 years
Factors related to the cost	0.800	0.497	3.94	3.60	3.76	3.65
Factors related to the time	0.135	0.939	3.83	3.85	4.00	3.88
Factors related to the quality	1.241	0.300	3.85	3.51	3.62	3.83
Owner requirements	0.801	0.497	3.88	3.61	3.74	3.78
Project Characteristics	0.547	0.651	3.73	3.53	3.33	3.43
External Environment	1.092	0.357	4.06	3.92	3.59	3.78
All fields	0.426	0.735	3.88	3.66	3.60	3.69
Critical value of F at df "3,88" and significance level 0.05 equal 2.71						

Thus, there are no statistically significant differences attributed to the age of the respondents at the level of $\alpha \leq 0.05$ between the means of their views on the procurement management in the construction industry.

4.6.5 Difference of responses due to the Years of experience of the respondents

This part aims at assessing if there are significant differences in responses due to the Years of experience. The independent samples-T test was used to check the differences due to the Years of experience where the responses limited in four answers which are (Less than 1 years, Less than 5 years, Less than 15 years and more than 15 years).

To test the hypothesis we use the one way ANOVA and the result illustrated in Table (4.26) which show that the p-value equal 0.735 which is greater than 0.05 , and the value of Fstat = 0.426 which is smaller than Fcritical = 2.71, that's means there is no statistically significant difference at level of $\alpha \leq 0.05$ about Procurement management in the construction industry refer to Years of experience.

Table (4.26): One way ANOVA results regarding the Years of experience of the respondents

Field	F-test	P-value	Mean			
			Less than 1 years	Less than 5 years	Less than 15 years	more than 15 years
Factors related to the cost	0.607	0.612	3.80	3.58	3.65	3.77
Factors related to the time	1.512	0.217	3.78	3.73	4.10	4.04
Factors related to the quality	1.968	0.125	3.80	3.43	3.68	3.71
Owner requirements	1.654	0.183	3.80	3.54	3.76	3.79
Project Characteristics	1.010	0.392	3.79	3.52	3.47	3.29
External Environment	1.279	0.287	4.19	3.90	3.75	3.75
All fields	0.761	0.519	3.88	3.62	3.68	3.65
Critical value of F at df "3,88" and significance level 0.05 equal 2.71						

Thus, there are no statistically significant differences attributed to the Years of experience of the respondents at the level of $\alpha \leq 0.05$ between the means of their views on the procurement management in the construction industry

4.6.6 Difference of responses due to the work position of the respondents

This part aims at assessing if there are significant differences in responses due to the work position. The independent samples-T test was used to check the differences due to the work position where the responses limited in four answers which are (Company manager, project manager, site engineer and office engineer).

To test the hypothesis we use the one way ANOVA and the result illustrated in Table (4.27) which show that the p-value equal 0.926 which is greater than 0.05 , and the value of Fstat = 0.155 which is smaller than Fcritical = 2.71, that's means there is no statistically significant difference at level of $\alpha \leq 0.05$ about Procurement management in the construction industry refer to Work position.

Table (4.27): One way ANOVA results regarding the work position of the respondents

Field	F-test	P-value	Mean			
			Company manager	Project manager	Site engineer	office engineer
Factors related to the cost	2.018	0.117	3.95	3.53	3.65	3.52
Factors related to the time	0.931	0.429	3.88	4.12	3.74	3.95
Factors related to the quality	1.156	0.331	3.68	3.80	3.49	3.52
Owner requirements	0.933	0.428	3.80	3.78	3.59	3.60
Project Characteristics	0.496	0.686	3.32	3.59	3.53	3.54
External Environment	1.074	0.364	4.05	3.63	3.85	3.93
All fields	0.155	0.926	3.73	3.70	3.63	3.66
Critical value of F at df "3,88" and significance level 0.05 equal 2.71						

Thus, there are no statistically significant differences attributed to the work position of the respondents at the level of $\alpha \leq 0.05$ between the means of their views on the procurement management in the construction industry

4.7 Top ten factors affecting on selection of procurement system in constructions industry over the procedures and policies in Supply Management

This section aims at assessing the most ten significant factors related to the applying procurement management in constructions industry. Table (4.28) illustrates the rank of top ten factors over the procedures and policies in supply management.

Table (4.28): Top ten factors affecting on applying procurement management

Statement	Phase	Mean	Rank
Availability of the materials may effect on procurements in construction projects	External environment	4.21	1
Contractor Reputation effect on the process procurements in construction projects.	Owner requirements	4.13	2
Delays in the financing of the project may effect on procurements in construction projects.	Owner requirements	4.12	3
Political Considerations may effect on procurements in construction projects	External environment	4.11	4
predicting the actual project tasks time may improve the procurements in construction projects.	Owner requirements	4.05	5
Tasks execution time are effect on procurements in construction projects	Owner requirements	4.04	6
Technical specification at end effect on the process procurements in construction projects.	Owner requirements	4.01	7
Economic condition of the country may effect on procurements in construction projects	External environment	3.96	8
Level of expertise involved effect on the process procurements in construction projects.	Owner requirements	3.93	9
Government as a policy maker may effect on procurements in construction projects	External environment	3.92	10

From Table (4.28), it's clear that six factors of the top ten were related to the owner requirements, and four factor to the external environment. This may indicate that owner requirements effects on applying procurement management. Furthermore, it can be grasped that project characteristics generally doesn't affect the closing phase strongly specially from the opinion of Gaza contractors. In other hand, the most important factor was the availability of the material, while (ElAgha, 2013) found that the price competition is the most important factor during his study. The reason is the date of ElAgha thesis was during the tunnels period when all the material was available and the competition in the market was clear. But in the date of this questionnaire, the closure from Israel still applied and the availability of the material still the problem.

Chapter 5

Chapter 5: Conclusion and recommendations

5.1 Introduction

Chapter five focuses on the conclusion and the practical recommendations that may contribute in serving the titled objectives of research. This study was based on quantitative approach in order to achieve the desired objectives. The aim of this research was to provide a platform of knowledge for the construction management practitioners in applying procurement system on the construction projects. The primary objectives of this research were to review procurement management methods at Palestine - Gaza Strip, to assess the impacts of procurement management on construction projects, to investigate the efficiency of the construction management practitioners to apply different procurement management methods in construction projects and to compile a list of the different factors affecting the selection of procurement management method. And stating the most important factors. 39 factors were studied through the different phases of the construction projects, the factors were about the procurement management on the construction projects.

5.2 Conclusion

Based on the results obtained from this research, the following research conclusion are drawn:

- A total of 39 factors affecting the procurement management on the construction projects were synthesized in the main three groups in the survey, which were shown to be reliable. Data were collected from a representative sample of professional procurement staff and consultants in the Gaza Strip. The findings from the empirical survey of this study show that there are seven most influential factors/criteria affecting the procurement management on the construction projects in Gaza Strip which are
    1. Availability of the materials (RII = 84.13 %),
    2. Contractor reputation (RII = 82.61 %),
    3. Delays in the financing of the project (RII = 82.39 %),
    4. Political Considerations (RII = 82.17 %),
    5. Predicting the actual project tasks time (RII = 81.00 %),
    6. Tasks execution time (RII = 80.87 %),
    7. Final technical specification (RII = 80.22 %).

  Clients can truly benefit from realizing the importance of above several factors into the procurement management on the construction projects.
- The six least influential factors, as evaluated by respondents, are: degree of flexibility, existence of a good relation and communication between members of the project team, risks allocation/avoidance during the project, disputes and arbitration, safety during the project stages the existence of competition in the bidding.

- All evidence prove that the procurement management on the construction projects could be helpful during the project.
- The most significant influence on the construction project was related to the availability of the materials in the local market .
- The most significant effects due to the cost was the delays in the financing of the project.
- The most significant effects due to the time from the top to lowest was the predicting the actual project tasks time
- The most significant effects due to the quality from the top to lowest was the predicting the contractor reputation
- The most significant effects due to the project characteristics from the top to lowest was the predicting the project size.
- The most significant effects due to the external environment from the top to lowest was the Availability of the materials.
- The results provide evidence of a positive impact of applying the procurement management in the construction industry.

5.3 Recommendations

As an extension to the obtained results the following suggested recommendation which are the most important ones that can be deduced by this research:

- It is necessary to believe that procurement management can be successfully applied in the construction industry and the advantages of it during the construction projects..
- Constructions industry involve various thousands of participants and activities, so that the efficient applying of procurement management will be valuable for the decision making.
- The construction contractors should pay attention to the risks problems of construction procumbent where the key to success is adopting the effective management measures of procurement risks.
- There are many efficient procurement management methods could be applied on construction industry and suited to Gaza strip construction industry.
- With the traditional culture in the presented organizational structure, it should be noted that understanding the true benefit of applying the procurement management in the construction industry.
- A practical methods for procurement management have to be developed so they take into account the characteristics and the special situation of construction.
- It is our hope that the researcher will have a deep study to generate the needed procedures to establish procurement management framework.

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Appendix A : Questionnaire (English)

The Islamic University of Gaza
Engineering Faculty
Graduate Studies
Construction Management Program

(Questionnaire)

Procurement Management In The Construction Industry

This Questionnaire is Partial Fulfillment of the Requirement for the Degree of Master of Science in Construction Management

Supervisor:

Dr. Khalid Abdel Raouf Al Hallaq
Dept. of Civil Engineering, IUG

Researcher:

Qosai Abdalhakim El-Ghefari

August ,2015

Survey Covering Letter

The Islamic University of Gaza

August 2015

Dear Sir/Madam,

To start, I appreciate that the questionnaire will take some of your valuable time. However, without your kind and expert input the ambitions of this research work can't be realized. To this end, I would like to thank you very much for your valued and kind consideration.

If you agree to participate, all the responses you provide will be completely confidential and will be used for the research purposes only.

My name is Qosai El-Ghefari and i am currently working on a research about applying procurement management in the construction industry. This research aim to provide a platform of knowledge for the construction management practitioners about applying procurement management on the construction projects. This research is being carried out in the Gaza Strip area, and your address has been selected by a scientific sampling method to ensure a representative picture of different views.

Questionnaire contents:

- Part 1: General information about the respondent and the organization.
- Part 2: Factors affecting the selection of procurement system.

Yours faithfully,

Qosai El-Ghefari

General information about the respondent and the company: Part 1.

General information about respondents

Please place a cross (X) in an appropriate box.

1.1 Gender :

☐ Male	☐ Female

1.2 specialization:

☐ Civil	☐ Architect	☐ Mechanical	☐ Electrical

1.3 **Highest earned degree**:

☐ Diploma	☐ Bachelor	☐ Master	☐ Ph.D.

1.4 Age:

☐ Less than 25 years	☐ Less than 35 years	☐ Less than 45 years	☐ more than 45 years

1.5 **Years of experience in procurement**:

☐ less than 1 year	☐ less than 5 year	☐ less than 15 year	☐ more than 15 years

1.6 **Work position**:

☐ Office engineer	☐ Site engineer	☐ C.M.	☐owner

1.1Organization profile

Please place a cross (X) in an appropriate box.

2.1 Organization Age:

☐ Less than 3 years	☐ Less than 10 years	☐ Less than 20 years	☐ more than 20 years

2.2 organization size:

☐ 1-4 employee	☐ 5-19 employee	☐ 20-49 employee	☐ more than 50 employee

2.3 Company field of work:

☐ Building	☐ Water and	☐ Road	☐ Public works and

	sewage		maintenance

2.4 Company classifications by the contractors union:

☐ first class	☐ second class	☐ third class

2.5 Size of the construction projects you worked in for the last three years:

☐ < 0.5 million $	☐ 0,5 - 1 million $	☐ 1 - 3 millions $	☐ >3 million$

Part 2: Procedures and policies in Supply Management in construction pr ojects

nts, please To what extent do you agree or disagree with the following stateme circle the number on the right against each question that best indicates your .opinion

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	2	3	4	5

2.1 Owner requirements

	A. Factors related to the cost:					
1	The existence of financial risk through the Implementation of the project has a direct impact materials procurement system in construction projects.	1	2	3	4	5
2	Delays in the financing of the project may effect on procurements in construction projects.	1	2	3	4	5
3	Accuracy during pricing may effect on procurement system in construction projects.	1	2	3	4	5
4	The existence of competition in the bidding negatively effect on the process of procurements in construction projects.	1	2	3	4	5
5	The possibility of completing the project within the budget clearly effect on procurements in construction projects.	1	2	3	4	5
6	The owner knowledge of materials in the market and construction industry may play a prominent role in the process of procurements in	1	2	3	4	5

	construction projects.					

	B. Factors related to the time:					
1	The appropriateness of the project schedule the actual time may work on facilitate the procurements in construction projects.	1	2	3	4	5
2	The ability to predict the obstacles may be reflected directly on the process of the procurements in construction projects.	1	2	3	4	5
3	predicting the actual project tasks time may improve the procurements in construction projects.	1	2	3	4	5
4	Tasks execution time are effect on procurements in construction projects	1	2	3	4	5

	C. Factors related to the quality:					
1	Correct and suitable design is directly effect on procurements in construction projects	1	2	3	4	5
2	Changes on architectural aspects by changing the owner's desire may effect on procurements in construction projects	1	2	3	4	5
3	Existence of a clear in the management department of the project directly effect on procurements in construction projects	1	2	3	4	5
4	Existence of a good relation and communication between members of the project team could facilitate the process procurements in construction projects.	1	2	3	4	5
5	Existence of a clear express of users' requirements may help on the process procurements in construction projects.	1	2	3	4	5
6	Quality of work may effect on the process procurements in construction projects.	1	2	3	4	5
7	Contractor Reputation effect on the process procurements in construction projects.	1	2	3	4	5
8	Technical specification at end effect on the process procurements in construction projects.	1	2	3	4	5
9	Level of expertise involved effect on the process procurements in construction projects.	1	2	3	4	5
10	Safety during the project stages effect on the process procurements in construction projects.	1	2	3	4	5

2.2 PROJECT CHARACTERISTICS

1	Project Type may effect on selecting of procurement system in construction projects.	1	2	3	4	5
2	Project Size may effect on procurements in construction projects.	1	2	3	4	5
3	Project Cost may effect on procurements in construction projects.	1	2	3	4	5

4	Degree of Flexibility may effect on procurements in construction projects.	1	2	3	4	5
5	Degree of complexity may effect on procurements in construction projects.	1	2	3	4	5
6	Time constrains may effect on procurements in construction projects.	1	2	3	4	5
7	Urgency of the owner to finish the project may effect on procurements in construction projects.	1	2	3	4	5
8	Risks Allocation/Avoidance during the project may effect on procurements in construction projects.	1	2	3	4	5
9	Disputes and arbitration may effect on procurements in construction projects	1	2	3	4	5
10	Teamwork during the project may effect on procurements in construction projects	1	2	3	4	5

2.3 EXTERNAL ENVIRONMENT

1	Market's competitiveness directly effect on procurements in construction projects.	1	2	3	4	5
2	Government as a policy maker may effect on procurements in construction projects.	1	2	3	4	5
3	Government as a major client may effect on procurements in construction projects.	1	2	3	4	5
4	Regulatory Environment may effect on procurements in construction projects.	1	2	3	4	5
5	Economic condition of the country may effect on procurements in construction projects.	1	2	3	4	5
6	Information Technology may effect on procurements in construction projects.	1	2	3	4	5
7	Natural disaster may effect on procurements in construction projects.	1	2	3	4	5
8	Political Considerations may effect on procurements in construction projects.	1	2	3	4	5
9	Availability of the materials may effect on procurements in construction projects.	1	2	3	4	5

Appendix B : Questionnaire (Arabic)

الجامعة الإسلامية
كلية الهندسة
عمادة الدراسات العليا

استبيان عن

"العوامل التي تؤثر على نظام استدراج العروض في صناعة التشييد في قطاع غزة"

هذا الاستبيان يهدف إلى دراسة العوامل المؤثرة في ادارة التوريدات في المشاريع الانشائية من خلال دراسة الإجراءات و السياسات والخطوات بالإضافة إلى تحديد العقبات و المشاكل التي تواجه عمليات جلب المواد.

نقدر عالياً تعاونكم معنا بتعبئة هذا الاستبيان مع الأخذ بعين الاعتبار أمانة و دقة وواقعية المعلومات و مع العلم أن المعلومات الموجودة في هذا الاستبيان لن يتم استخدامها إلا في أغراض البحث العلمي . نرجو من حضراتكم قراءة التعليمات السابقة لكل جزء من أجزاء الاستبيان بدقة و عناية .

نشكر لكم مسبقاً تعاونكم و دعمكم لمسيرة البحث العلمي

الباحث
قصي عبدالحكيم موسى الغفري

المشرف
الدكتور : خالد الحلاق

أغسطس 2015

محتويات الإستبيان:

الجزء الأول: معلومات عامة

الجزء الثاني: الاجراءات والسياسات المتبعة في ادارة التوريدات في المشاريع الانشائية

الجزء الأول : معلومات عامة

1. القسم الأول: معلومات عن المسؤول عن تعبئة الإستبانة.
2. القسم الثاني: السيرة الذاتية للشركة.

2. القسم الأول: معلومات عن المسؤول عن تعبئة الإستبانة.

2.1 الجنس:

ذكر☐	انثى☐

2.2 التخصص:

مهندس مدني☐	مهندس معماري☐	مهندس ميكانيكي☐	مهندس كهرباء ☐

2.3 المستوى العلمي:

دبلوم☐	بكالوريوس ☐	ماجستير☐	دكتوراه☐

2.4 العمر:

أقل من25 سنة☐	أقل من 35 سنة☐	أقل من 45 سنة ☐	45 سنة فأكثر ☐

2.5 الخبرة في استدراج العروض:

أقل من سنة ☐	أقل من 5 سنوات ☐	أقل من15 سنة☐	15 سنة فأكثر☐

2.6 طبيعة العمل لمن يقوم بتعبئة الاستبانة:

مدير شركة ☐	مدير مشروع☐	مهندس موقع☐	مهندس مكتب ☐

3. القسم الثاني: السيرة الذاتية للشركة.

3.1 عمر الشركة:

أقل من 3 سنوات ☐	أقل من 10 سنوات ☐	أقل من20 سنة☐	20 سنة فأكثر☐

3.2 حجم الشركة:

من 1 حتى 4 موظف☐	من 5 حتى 19 ☐ موظف	من 20 حتى 49 ☐ موظف	50 موظف فأكثر ☐

3.3 طبيعة العمل (نوع العمل):

أعمال أبنية☐	أعمال مياه وصرف ☐ صحي	أعمال طرق☐	أشغال عامة وصيانة☐

3.4 تصنيف الشركة حسب اتحاد المقاولين:

درجة أولى☐	درجة ثانية☐	درجة ثالثة☐

3.5 متوسط حجم المشاريع السنوي:

أقل من0.5 مليون $☐	أقل من 1 مليون $☐	أقل من3 مليون $☐	فأكثر 3مليون $ ☐

الجزء الثاني : الاجراءات والسياسات المتبعة في ادارة التوريدات في المشاريع الانشائية

الجداول في الأسفل تحتوي على العديد من الجمل التي تصف معرفتكم ، تصرفاتكم و إرادتكم تجاه تطبيق جلب المواد ، من فضلكم أرجو اختيار درجة موافقتكم على كل جملة من الجمل و ذلك عبر مقياس الموافقة الموضح (1: غير موافق بشدة ، 5 : موافق بشدة)

1. متطلبات المالك

الرقم	البند	درجة الموافقة				
	أ- العوامل المرتبطة بالتكلفة:					
1	يؤثر وجود المخاطرة المالية خلال تنفيذ المشروع بشكل مباشر على جلب المواد في المشاريع الإنشائية.	1	2	3	4	5
2	قد يعمل حدوث تأخير في تمويل المشروع على تأخير جلب المواد في المشاريع الإنشائية.	1	2	3	4	5
3	قد يلعب نسبة التأكد من تسعير المشروع دوراً في إنجاح عملية جلب المواد في المشاريع الإنشائية.	1	2	3	4	5
4	تؤثر وجود المنافسة في العطاءات سلباً على عملية جلب المواد في المشاريع الإنشائية.	1	2	3	4	5
5	تنعكس احتمالية اكمال المشروع ضمن الميزانية المرصودة بشكل مباشر على جلب المواد في المشاريع الإنشائية.	1	2	3	4	5
6	تدخل المالك ومعرفته بالمواد والانشاءات قد يلعب دوراً بارزاً في عملية جلب المواد في المشاريع الإنشائية.	1	2	3	4	5
	ب- العوامل المرتبطة بالوقت:					
1	قد يعمل مدى ملائمة الجدول الزمني للمشروع للوقت الفعلي على تسهيل عملية جلب المواد.	1	2	3	4	5
2	قد تنعكس القدرة على تنبؤ المعوقات مباشرة على عملية جلب المواد في المشاريع الإنشائية.	1	2	3	4	5
3	يساهم التأكد من الزمن الفعلي لإكمال المشروع في تحسين عملية جلب المواد في المشاريع الإنشائية.	1	2	3	4	5
4	ترتبط سرعة العمل والتنفيذ خلال فترة المشروع بعملية جلب المواد في المشاريع الإنشائية.	1	2	3	4	5
	ت- العوامل المرتبطة بالجودة:					
1	قد تنعكس صحة التصميم بشكل مباشر على سرعة جلب المواد في المشاريع الإنشائية.	1	2	3	4	5
2	قد يعمل تغيير الجوانب الجمالية والمعمارية المتغيرة حسب رغبة المالك على إعاقة عملية جلب المواد في	1	2	3	4	5

	المشاريع الإنشائية.					
3	ينعكس وجود هيكلية واضحة في إدارة المشروع على سريان عملية جلب المواد في المشاريع الإنشائية.	1	2	3	4	5
4	يساهم الانسجام بين اعضاء فريق المشروع في تسهيل عملية جلب المواد في المشاريع الإنشائية.	1	2	3	4	5
5	قد يكون لوضوح محددات المشروع دور هام في عملية جلب المشاريع الإنشائية.	1	2	3	4	5
6	قد ينعكس مدى تحقيق الجودة في تنفيذ الاعمال والأنشطة إيجابياً على عملية جلب المواد في المشاريع الإنشائية.	1	2	3	4	5
7	قد يكون لسمعة المقاول أثر واضح في عملية جلب المواد.	1	2	3	4	5
8	قد يكون للمواصفات الفنية النهائية المطلوب توفرها وتحقيقها في المشروع دور بارز في عملية جلب المشاريع الإنشائية.	1	2	3	4	5
9	قد ينعكس مستوى الخبرة العملية للمشاركين في المشروع مباشرة على جلب المواد في المشاريع الإنشائية.	1	2	3	4	5
10	قد يؤثر تحقيق الأمن والسلامة داخل المشروع على جلب المواد في المشاريع الإنشائية.	1	2	3	4	5

2. مواصفات المشروع

الرقم	البند	درجة الموافقة				
1	قد يؤثر نوع العقد على أسلوب جلب المواد في المشاريع الإنشائية.	1	2	3	4	5
2	قد يرتبط حجم المشروع ارتباطاً وثيقاً في جلب المواد في المشاريع الإنشائية.	1	2	3	4	5
3	قد ينعكس وجود مرونة في إحداث تغيرات على بنود الاعمال داخل المشروع على طبيعة جلب المواد في المشاريع الإنشائية.	1	2	3	4	5
4	قد تلعب صعوبة تنفيذ الأنشطة داخل المشروع دوراً واضحاً في جلب المواد للمشاريع الإنشائية.	1	2	3	4	5
5	قد تتأثر عملية جلب المواد بوجود قيود على الوقت في المشروع.	1	2	3	4	5
6	قد تتأثر عملية جلب المواد في المشاريع الإنشائية بوجود آلية محددة لدفعات المقاول.	1	2	3	4	5
7	قد ترتبط آلية جلب المواد باستعجال المالك للمقاول في تسليم المشروع.	1	2	3	4	5
8	قد يكون لتوزيع المخاطر أو تجنبها ارتباط واضح في سريان عملية جلب المواد.	1	2	3	4	5
9	قد يكون للنزاعات والتحكيم أثر مباشر على عملية جلب المواد.	1	2	3	4	5
10	تحقيق العمل الجماعي في المشروع ينعكس على عملية جلب المواد.	1	2	3	4	5

3. عوامل خارجية

الرقم	البند	درجة الموافقة				
1	ينعكس مدى التنافس بين الموردين في السوق المحلي على طرق جلب المواد في المشاريع.	1	2	3	4	5
2	قد تتأثر عملية جلب المواد بمدى مساندة الحكومة كجهة واضعة للسياسات.	1	2	3	4	5
3	قد تتأثر عملية جلب المواد بمدى مساندة الحكومة كجهة مالكة.	1	2	3	4	5
4	قد ينعكس وجود البيئة التنظيمية في المشروع على عملية جلب المواد في المشاريع الإنشائية.	1	2	3	4	5
5	قد يكون للأوضاع الاقتصادية العامة انعكاس على عملية جلب المواد.	1	2	3	4	5
6	قد يخدم تطبيق تكنولوجيا المعلومات عملية جلب المواد في المشاريع الإنشائية.	1	2	3	4	5
7	قد ترتبط عملية جلب المواد مباشرة بحدوث القوة القاهرة في المشاريع الإنشائية.	1	2	3	4	5
8	قد يوجد للاعتبارات السياسية دور فاعل في عملية جلب المواد.	1	2	3	4	5
9	قد يلعب توفر المواد في السوق المحلي دوراً في تحديد طرق جلب المواد.	1	2	3	4	5

أرجو كتابة أي ملاحظة تفيد في تحديد المؤثرات على عملية استدراج العروض:

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All thanks and praise belongs
to
ALLAH
"***Al-hamdulillah***"