Mu'tah University
College of Graduate Studies

Evaluating of the Pre-Qualification and Classification Criteria of Engineering Offices in the Field of Safety and Occupational Health

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والموسومة بـ: **Evaluating of the Pre-Qualification and Classification Criteria of Engineering offices in the field of safety and occupational health**

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الاهداء

الى الجبل الأشم الذي انار دربي وبذل جهد السنين من اجل ان اعتلي سلالم النجاح والتميز، الى اعظم شخص في حياتي إلى من ارفع رأسي عالياً افتخاراً به ... (ابي)

إلى نور عيني إلى التي أهدتني وردة عند كل عثرة، ورفعتني عند كل كسر.. الى نبض قلبي ومن دعاءها سر نجاحي ... (امي)

إلى رياحين حياتي اخواتي رانيا وعبير، واخواني عيسى، علي ومحمد رفقاء دربي الذين ساندوني ليل نهار

الى عائلتي والاحباب والاصدقاء الذين ساندوني بكل الحب

اهدي هذا العمل .....

الشكر والتقدير

لا يسعني بعد الانتهاء من اعداد هذه الرسالة الا ان اتقدم بجزيل الشكر وعظيم الامتنان الى استاذي الفاضل

البروفيسور سلطان الطراونة

الذي تفضل بقبول الاشراف على هذه الرسالة والذي لم يؤل جهدا في مساعدتي ومساندتي في هذا العمل، فلم يبخل علي سواء بوقته الثمين، او النصح والارشاد طيلة فترة الاعداد فله مني كل الشكر والتقدير.

واتقدم بالشكر موصولا للاساتذة اعضاء لجنة المناقشة : الاستاذ الدكتور سلوم جبوري، الاستاذ الدكتور مخلد الطراونة والدكتور هاني الرواشدة وذلك لتفضلهم بالموافقة على مناقشة هذه الرسالة.

كما وأتقدم بجزيل الشكر والعرفان لجميع من قدم لي المساعدة حتى تظهر هذه الرسالة إلى النور.

منار محمود

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List of Abbreviations

ANOVA	Analysis of Variance.
GDP	Gross Domestic Product.
KMO	Kaiser Mayer Olkin.
MSA	Measurement System Analysis.
OHS	Occupational Health and Safety.
RII	Relative Important Index.
SPSS	Statistical Package for the Social Sciences.
VIF	Variance Inflation Factor.
WHO	World Health Organization.

ABSTRACT

Evaluating of the Pre-Qualification and Classification Criteria of Engineering Offices in the Field of Safety and Occupational Health

Manar Mahmoud Issa Abdelrahman

Mutah University, 2020

This research aims to study the pre-qualification and classification criteria of offices and engineering companies that provide services in the field of occupational safety and health, as the research problem is summarized in the absence of a system for pre-qualification and classification in the field of occupational safety and health for engineering offices. And conducted this study by reviewing the literature on issues related to the pre-qualification and classification process and then followed by a field survey. The field survey process was carried out through a questionnaire distributed to 294 managers, experienced people, and engineers working in offices and engineering companies.

Based on the analysis of the questionnaire, it was found that there are important criteria for the pre-qualification and classification process for engineering and consulting offices in the field of occupational safety and health, which are respectively according to RII: academic qualification in the field of occupational safety and health for supervisors (0.8878), an approved professional certificate in the field of occupational safety and health for project managers and leaders of the teams and officials within the engineering office (0.8633), a training course of no less than 30 hours in the field of occupational safety and health (0.8571).

The study has several recommendations, such as applying the model that was developed, to qualify the engineering offices and consultant companies in the field of the occupational safety and health, and applying the theoretical framework for it, by the authorities concerned with pre-qualification and classification.

الملخص

تقييم معايير التأهيل والتصنيف للمكاتب الهندسية في مجال السلامة والصحة المهنية

منار محمود عيسى عبد الرحمن

جامعة مؤتة، 2020

يهدف هذا البحث إلى دراسة معايير التأهيل والتصنيف المسبق للمكاتب والشركات الهندسية التي تقدم خدمات في مجال السلامة والصحة المهنية، حيث تلخصت مشكلة البحث في عدم وجود نظام للتأهيل والتصنيف في مجال السلامة والصحة المهنية للمكاتب الهندسية. واجريت هذه الدراسة من خلال استعراض الأدبيات من المواضيع المتعلقة بعملية التأهيل والتصنيف المسبق ثم أتبعت بمسح ميداني، عملية المسح الميداني تمت من خلال استبانه وزعت على 294 من المدراء وأصحاب الخبرة والمهندسين العاملين في المكاتب والشركات الهندسية.

بناء على تحليل الاستبانه تبين أن هناك معايير مهمة لعملية التأهيل والتصنيف المسبق للمكاتب الهندسية والاستشارية في مجال السلامة والصحة المهنية ، وهي على التوالي حسب مؤشر الاهمية النسبية: المؤهل الأكاديمي في مجال السلامة والصحة المهنية للمشرفين بمؤشر (0.8878) ، شهادة مهنية معتمدة في مجال السلامة والصحة المهنية لمديري المشاريع وقادة الفرق والمسؤولين داخل المكتب الهندسي بمؤشر (0.8633) ، دورة تدريبية لا تقل عن 30 ساعة في مجال السلامة والصحة المهنية بمؤشر (0.8571).

وقد توصلت الدراسة إلى عدة توصيات مثل : تطبيق النموذج الذي تم تطويره من أجل التأهيل والتصنيف للمكاتب الهندسية والشركات الاستشارية في مجال السلامة والصحة المهنية، وتطبيق الإطار النظري لها من قبل الجهات المعنية بالتأهيل والتصنيف.

CHAPTER ONE
THEORETICAL BACKGROUND

1.1 Introduction

Jordan has recently witnessed remarkable development and great activity in the field of engineering, and from this point of view it was necessary to emphasize and maintain the safety and occupational health matters in this field, it is involved in all areas of life and all professional areas, as this science is firmly established in many standards and requirements that must be followed to maintain our safety and safety around us (Sarireh & Tarawneh, 2013).

This development is also accompanied by many risks, and therefore to maintain the health and life of the workers who are the main and main element in this development, the highest and first priority should be given to occupational safety and health (Yilmaz and Celebi, 2015).

There must be criteria for pre-qualification, taking into account the safety of projects according to the required quality. Setting standards by the nature of the projects and the specificity they cover and would filter companies for the best to implement projects with the least possible problems (Roads, 2008).

Aware of the magnitude of the challenges affecting offices and engineering companies, we may seek to submit a new proposal that includes competence in the safety and occupational health of offices and engineering companies in the unions and ministries concerned within a specific framework, where the allocation in this area to those who possess the required skill, which to suit the nature of the work to be done, it will help reduce the incidence of accidents in projects, guide them to a safe and proper working method, provide the right work environment and reduce the challenges they may affect.

Contractor selection is a very important issue in the construction industry since the contractor has an essential role in the success or failure of projects in this sector. Thereby, it is imperative to identify criteria and methodologies adequate to this selection problem to choose satisfactory suppliers for the projects (Araújo, et al., 2015).

1.2 Importance of the Research

Although there is a system for the pre-qualification and classification of engineering offices in various fields of engineering, there is no system for the pre-qualification and classification of engineering offices in the field of safety and occupational health.

The importance of the study for researchers and those interested in this field, that it will have a great impact on increasing the researcher's

knowledge and experience in this field. For those interested in this field, whether from engineers working in the evaluation of consulting offices or interested in using modern quantitative methods of decision-making, this study provides rich and valuable information.

The importance of the research comes to the development of a new system of pre-qualification and classification in the field of occupational safety and health in offices and engineering companies and development in the engineering sector and upgrading it (Alzober & Yaakub, 2014).

As this system of classification and pre-qualification of engineering offices in the field of occupational safety and health will lead to the screening of these offices based on capacity, capabilities, and experiences, which will be reflected on the performance of the market in general, with the need for mechanisms to apply, and tightening control and follow-up on offices (Offices,2011).

The importance of the system recognizing the possibility of combining contracting and consulting activities in reducing costs (Offices,2011).

1.3 Research Problem

Due to the development in the field of engineering and repeated accidents in engineering projects, and to promote the engineering field more and to obtain the required quality and reduce accidents, it was necessary to have a program and system in the unions and ministries to classify the engineering offices through the development of a system for the pre-qualification and Engineering offices in the field of safety and occupational health, the pre-qualification process for engineering offices is a system to support multivariate decision-making for inputs of various qualitative and quantitative information. Therefore, the most important criteria that affect pre-qualification must be identified (Alzober & Yaakub, 2014).

Where engineering projects are considered risky, therefore, the presence of the safety section in engineering offices leads to a substantive impact by reducing injuries and cost, as most engineering accidents result from basic root causes such as a lack of appropriate training and insufficient application of safety, equipment, and unsafe methods or insecure coordination, and site conditions Unsafe, non-use of safety equipment provided and bad attitude towards safety (Department of Psychology, 2014).

The occupational safety and health department within the facility is a section that is important in terms of the involvement of management within the facility in problem-solving and development, as the presence of the department that specializes in the field of occupational safety and health comes to achieve the improvement of the efficiency and skill of workers in

this field so that they can do the identification of risks and accidents and their causes and methods of prevention and analysis And measuring and managing occupational safety and health in a manner that achieves work quality and increases productivity, and works to protect workers from the effects of risks in the field of safety and security (Office, 2003).

The importance of establishing this section in safety engineering comes given its importance, which is one of the most important responsibilities that must be included in any strategy for any institution or establishment because occupational safety is associated with all areas of life and its great importance in protecting lives and property, the environment, leadership, direction, and guidance, setting rules and spreading awareness Preventive and indicative technical instructions, and all these characteristics make them so important that they must take an important place in all work (Michaels, 2011).

1.4 Research Aim

The research aims mainly to restructure the classification criteria and prequalification of the engineering offices and companies that provide services in the field of occupational safety and health so that engineering offices are chosen according to these criteria so that they can carry out their technical services in the field of occupational safety and health.

1.5 Research Objectives

The research will investigate:

1. To determine the criteria that must be taken into consideration for the pre-qualification and classification stage in the field of occupational safety and health.
2. To investigate the impact or any verb the impact of the size of the projects implemented by the company in the field of occupational safety and health on the pre-qualification and classification criteria.
3. To know how the work experience in the field of occupational safety and health of the engineering office affects the pre-qualification and classification criteria in the field of occupational safety and health.
4. To compare the results obtained in Jordan with the results from other countries.
5. To suggest a Model or theoretical framework for pre-qualification and classification in the field of occupational safety and health.

1.6 Research Questions

This research aimed at answering the following questions:

1. What are the criteria that must be considered for the pre-qualification and classification stage in the field of occupational safety and health in the engineering office?

2. To what effect does the size of the projects implemented by the company in the field of occupational safety and health affect the pre-qualification criteria and classification in the field of occupational safety and health؟
3. How does the work experience in the field of occupational safety and health of the engineering office affect the pre-qualification criteria and classification in the field of occupational safety and health?
4. What are the similar criteria in the pre-qualification and classification of engineering offices between previous studies and this study?

1.7 Research Hypothesis

1. Is there statistical significance at the level of significance at ($\alpha \leq 0.05$) between the pre-qualification and classification criteria in the field of occupational safety and health and the scientific level of engineers؟
   Ho: there is no statistical significant at ($\alpha \leq 0.05$) between the pre-qualification and classification criteria in the field of occupational safety and health and the scientific level of engineers.
   H1: there is statistical significant at ($\alpha \leq 0.05$) between the pre-qualification and classification criteria in the field of occupational safety and health and the scientific level of engineers.
2. Is there an effect of the size of the projects implemented by the company in the field of occupational safety and health on the pre-qualification and classification criteria?
   Ho: there is no statistical significant effect of the size of the projects implemented by the company in the field of occupational safety and health on the pre-qualification and classification criteria.
   H1: there is statistical significant effect of the size of the projects implemented by the company in the field of occupational safety and health on the pre-qualification and classification criteria.
3. Is there an impact of the work experience in the field of occupational safety and health of the engineering office on the pre-qualification criteria and classification in the field of occupational safety and health?
   Ho: there is a no impact of the work experience in the field of occupational safety and health of the engineering office on the pre-qualification criteria and classification in the field of occupational safety and health.
   H1: there is an impact of the work experience in the field of occupational safety and health of the engineering office on the pre-qualification criteria and classification in the field of occupational safety and health.

1.8 Thesis Structure

The following Figure 1.1 shows the thesis flowchart, that's leads to achieve the research.

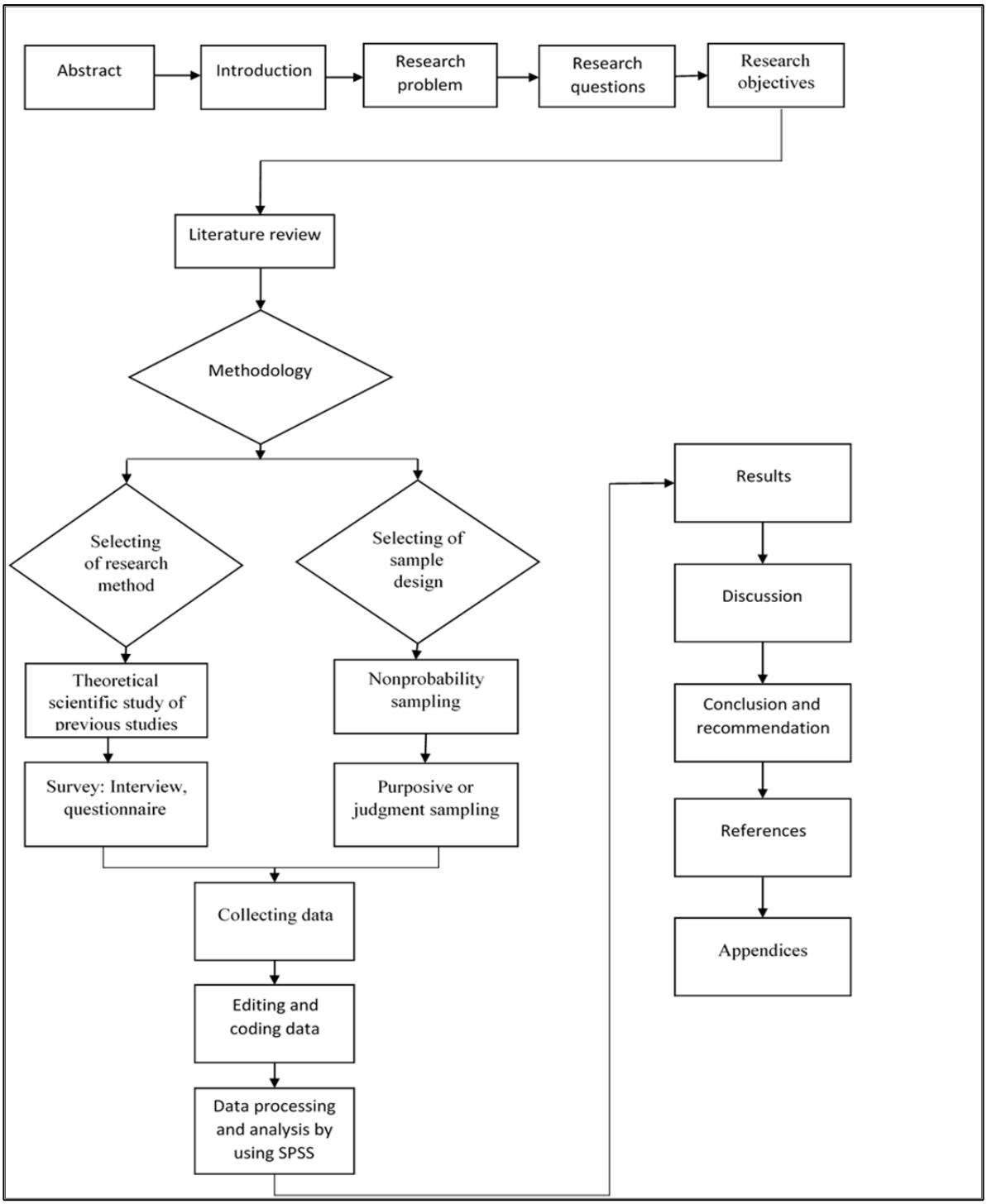

Figure 1.1: Thesis Flowchart

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter focuses on subjects that are available in the literature and related to the pre-qualification and classification criteria of engineering offices in the field of safety and occupational health. The main topics that are included in the chapter are classification in engineering offices, general standards for office classification in engineering offices, pre-qualification in general for engineering offices and consultant companies, general standards for engineering office pre-qualification, pre-qualification for consultant, pre-qualification in construction, occupational safety and health, the importance of occupational safety and health in construction and general pre-qualification and classification of offices practice around the world.

2.2 Classification of the Engineering Offices

Determining the professional level of the work by its technical and administrative capabilities and expertise in the field of safety and occupational health (Association, 2020).

According to the general criteria for the classification of technical service providers or engineering offices, the classification criteria and requirements include the terms of reference of the technical service provider, his performance, the technical and administrative group, his experiences in the required specialty, its equipment and capabilities as set out in the Appendixes mentioned in these instructions and generally include (Association, 2020):

1. The financial, administrative, and technical status of the technical service provider and the experience of the founders and full-time partners to work in it.
2. Field specializations and other chiefs' expertise.
3. Duration and continuity of the competence of the technical service provider, as well as the continuity of the work of the heads of specialization.
4. Projects in the public and private sectors that the technical service provider studied and / or supervised inside and outside the Kingdom.
5. Office space and equipment according to instructions.
6. Performance certificates from employers.
7. The general impression.

And according to general provisions of the instructions for classifying technical service providers (Consulting Engineering Offices), the criteria listed below are an added benefit to all technical service providers, and are as follow (Association, 2020):

1. Geographical spread - outside Jordan.
2. Incentive systems and social activities.
3. Office partners' contribution to serving the local community.
4. Organizing training courses.

2.3 General Standards for Office Classification in Engineering Offices

There is a system for engineering offices and companies in Jordan that is issued by the engineer's association and where it is stipulated that some things are required for classification and pre-qualification, as the board of the commission undertakes some tasks, including (Assosiation,2019):

1. Supervising engineering offices and companies and following up their affairs with the association.
2. Organizing, advancing, and developing engineering consulting work.
3. Study applications for the registration, classification and amendment of engineering offices and companies.
4. Registration of certified heads and engineers working for offices and engineering companies.

And engineering offices and companies are classified into any of the following categories (Assosiation,2019):

1. The category of an engineer's office to perform engineering consultancy work in one of the engineering majors and be on any of the following two levels:
    1. Engineer Office (A).
    2. Engineer Office (B).
2. An opinion engineer's office to perform the consulting engineering work in one of the engineering specializations, according to specific and specific conditions.
3. A class of engineering office to perform consulting engineering work in two or more engineering specializations.
4. A category of consulting office to perform engineering consulting work in two or more engineering specializations.

And according to technical instructions for engineering offices and companies authority, there are conditions and requirements for engineering offices registration according to the system in the Engineers Association (2020), including legal requirements for office registration, includes Jordanian nationality, he must be full-time to practice the profession in his office, he must have practiced the profession for a period of not less than (7) years, of which (3) years are in design work, in which the full-time technical staff is available, it is required for the registration of the office or the engineering company to pass Its owner/owner is the readiness interview held by a specialized committee to be formed for this purpose, and an

interview with the engineer/engineers working in the office, including the founders of the office's department.

2.4 Pre-Qualification in General for Engineering Offices and Consultant Companies.

Pre-qualification is an essential process in the development of engineering projects and the selection of engineering offices and contractors who have the qualifications and experience, which would reduce the risks of bad performance on the part of contractors and their offices, and in terms of project development, where time, cost, and efforts are made by selecting the appropriate and efficient offices to implement these projects in accordance with the requirements (Mohamed & Majeed,2016) (Development, 2012).

Pre-qualification is a screening process for contractors, which is a very important step. Choosing the right office gives the client confidence that the qualified office enables it to meet the requirements and achieve the desired goals (El-Sawalhi, et al., 2007).

The pre-qualification process for engineering / consulting offices is carried out by collecting and evaluating information, which would determine for the office and the contractor its capacity, resources, management, performance, financial capacity, guarantee, work history, licensing, qualifications, quality and public safety (Safeopedia, 2019).

The author finds that pre-qualification, in its simplest form, for engineering offices is an assessment of financial responsibility in the main (Gransberg, 2009).

In another way, the pre-qualification of engineering and consulting offices works effectively to improve the performance of engineering and consulting offices, as we find that there is a diversity in the capabilities of engineering/ consulting offices, whether from first, second or third degree offices, and a variety in terms of capabilities and performance (Projects, 2015).

From his point of view, he finds that pre-qualification focuses mainly on the elements of importance in performance, human resources, devices, tools and programs used, and the experience of the engineering office (Projects, 2015).

While in the private sector, they give more importance to the interaction of contractors to cooperate with a client and work as a team, financial arrangements, the contractor's administrative capabilities, and the efficiency of his project supervision apparatus (Tarawneh, 2004).

2.5 General Standard for Engineering Office Pre-Qualification

The criteria and requirements of the pre-qualification include the competence of the technical service provider, which is safety and occupational health, his expertise, technical staff, equipment and capabilities, and in general includes the financial, administrative and technical situation, the expertise of the heads of competence and other cadres, the duration of competence and projects in the public and private sectors (Ltd, 2020) (Bubshait & Al-Gobali, 2014), which the millennium service provider has studied and supervised, where these criteria and requirements must be met in order to obtain the classification (Association, 2019).

The researcher believes that one of the most important criteria for engineering offices is financial stability, technical expertise, contracting companies on the blacklist, past performance, contractor reputation and managerial ability of the company (Mohamed & Majeed, 2016).

The contractor pre-qualification selection criteria are characterized by the coexistence of quantitative and qualitative data. The ideal decision support system for pre-qualification of the contractor should have the ability to process quantitative and qualitative data, and to mapping complex non-linear relationship of selection criteria, so that logical and consistent decisions can be made (Cheung, et al., 2000).

Contractor pre-qualification is a process of evaluating the ability of nominated contractors to complete a contract satisfactorily before they are accepted into the bidding process (Cheung, et al., 2000). The current practice of prequalification is that by practicing accumulated experience and judgment in evaluating a certain set of criteria (input variables), such as reputation, past performance, financial stability, current workload, capacity of company resources, records of expertise and technical expertise, decision makers arrive at a conclusion about qualification or Ineligibility (output variables) for each contractor. Uncertainty, lack of linearity, inaccuracy, subjectivity and lack of experience and knowledge within the process make the task difficult (Cheung, et al., 2000).

A comprehensive literature review by the researchers revealed that the most acceptable pre-qualification criteria for a contractor are financial stability, management and technical capacity, contractor experience, contractor performance, resources, quality management, and health and safety concerns (El-Sawalhi, et al., 2007).

The pre-qualification process determines whether the applicant/ manufacturer meets the minimum requirements detailed in the relevant ISO standards and WHO/UNFPA Specifications. Under review are product quality, safety, production and quality management (Unfpa,2019).

All pre-qualified manufacturing sites are subject to re-qualification every three years for continuous quality monitoring. The lists are updated if there are any changes in the status of manufacturing sites, and when new manufacturing sites or products become pre-qualified (Unfpa,2019).

2.6 Pre-Qualification for Consultant

The pre-qualification certificate, granted to engineering offices and consultant companies, enables the consultant to participate in tenders for engineering services in several fields, and to submit technical and engineering tenders offered by public sector institutions (Works, 2020).

According to Sultan Tarawneh (2014), has identified the factors affecting the pre-qualification process for engineering offices and consulting companies in Jordan, where he found several criteria of high importance to be adopted as basic criteria for the qualification of engineering offices and consulting companies in Jordan. Among these: the year of establishment of the engineering office or the consulting company, the company's experience inside and outside the Kingdom, the technology used, the company's experience in implementing similar works in the last years, and the company's capital (Tarawneh, 2014).

2.7 Pre-Qualification in Construction

The results of this study suggested that organizations should give more importance to the health and safety of construction crews to reduce construction risks. Before starting construction work, companies should prepare workers and train them in safety and health to avoid risks (Saeed, 2017). Contractors should encourage employees to follow health and safety instructions (Saeed, 2017). Through working supervisors, organizations can reduce health and safety risks by providing working supervisors to each working group working in different locations within the same projects (Saeed, 2017). Employees must have sufficient experience and knowledge to encourage workers to do business safely (Saeed, 2017). the most important criterion adopted by the business owner is the qualification of the contractor according to the bid value (Tarawneh, et al., 2003). It was also found that the employer - during the pre-qualification process - gives importance to some other criteria such as experience in similar projects, the reputation and experience of the contractor, the scientific level of the contractor, the certificate of good conduct granted to the contractor in previous projects, the available equipment and the contractor's financial ability (Tarawneh, et al., 2003).

According to Tarawneh (2004), studied the perception of the main clients of the importance of pre-qualification standards used to qualify contractors in the Jordanian construction industry. Where it was found that there are different views of each of the clients in the public and private

sectors about the most important pre-qualification criteria and their priority (Tarawneh, 2004).

The public sector gave more importance to the willingness of contractors to offer an acceptable and competitive price, financial arrangements and the company's experience in similar fields (Tarawneh, 2004).

2.8 Occupational Safety and Health

It is a branch of health that aims to improve the health of workers in all professions and keep them in the highest levels of physical, psychological and social well-being and prevent health deviations that may cause workers to leave work conditions, as well as promote a safe and healthy work environment. The occupational safety and health also protects employees, co-workers, family members, employers, clients and many other people who may be affected by the work environment from all health risks in the workplace (Alli, 2001).

The World Health Organization (WHO) has also defined the manner in which occupational health deals with all aspects of health and safety in the workplace and has a strong focus on primary risk prevention. Health has been defined as a complete physical condition, mental and social well-being and not merely the absence of disease or disability (Alli, 2001) (Mathew, 2015).

Occupational health is an interdisciplinary field of health care concerned with enabling the individual to practice his or her profession, in the manner that causes the least harm to his health. It is aligned with the promotion of health and safety at work, which is concerned with preventing harm from hazards in the workplace (Alli, 2001).

The main focus in occupational health is placed on three different goals: (1) maintaining and enhancing the health of workers and their ability to work; (2) improving the work environment and work in a way that leads to safety and health, and (3) developing work organizations and work cultures in a direction that supports Health and safety at work, thus also promoting a positive social climate and smooth operation and may enhance the productivity of undertakings (Quintana, et al., 2015).

Occupational health and safety management systems are part of a comprehensive management system that facilitates the management of occupational health and safety risks associated with the organization's business. This includes the organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the organization's occupational safety and health policy (Kamar1,, et al., 2014).

2.9 The Importance of Occupational Safety and Health in Construction

Occupational Health and Safety (OHS) in the construction industry is an important source and of grave concern all over the world due to its complex nature indeed. Where the construction industry is a major factor in the overall economic growth of any country through its contributions to annual (GDP) growth and the provision of job opportunities for individuals, institutions and resources (Mathew, 2015).

Therefore, occupational health and safety standards must be included, implemented and supported in the construction project period (this includes design, procurement, maintenance, demolition and excavation). Likewise, the implementation of safety and health should include a path towards creating tasks that are commensurate with workers' capacity and organized according to the highest work standards. Focusing on this will help ensure that workers in the construction industry become less vulnerable (Lehtinen & Joronen, 2013).

On the other hand, the development and improvement of Occupational Safety and Health (OSH) in this field is a slow process, but with work it becomes achievable (Lehtinen & Joronen, 2013).

The most frequent incidents are in the construction industry, yet interest in it is very low. Safety and occupational health is one of the most important sciences and departments in the offices and engineering companies, whose goal is to protect workers in factories and work facilities from possible accidents that may cause injuries to the worker as well as damage to the property of the establishment (Sarireh & Tarawneh, 2013) (Yilmaz and Celebi, 2015).

It must be remembered that construction projects do not operate separately from the community in which they are located. As construction is considered one of the most dangerous occupations in the world, causing more occupational deaths than any other sector (Mathew, 2015), the development of an effective OSH culture must begin at a high government level and be implemented throughout government, employers and employee organizations (Lehtinen & Joronen, 2013).

Adequate safety equipment and procedures can reduce the risk of occupational injuries in the construction industry. Given the fact that accidents can have dire consequences for employees as well as organizations, it is critical to ensure health and safety of workers and compliance with HSE construction requirements (Quintana, et al., 2015).

Table 2.1 Shows the Comparisons between the published prequalification and classification criteria (review of criteria in literature from 2006 to 2018).

Note ** Author number from 1 to 8, indicates to author study and year of publish, which is as following: 1- Contractor Selection Criteria in Ghanaian Construction Industry: Benefits and Challenges (Ayettey & Danso , 2018), 2- Criteria for supplier

selection: A literature review (Stević , 2017), 3- Pre-qualification of contractors in Irag (Mohamed & Majeed, 2016), 4- Classification of the bid/no bid criteria - factor analysis (Lesniak , 2015), 5- Contractor's Awareness on Occupational Safety and Health (OSH) Management Systems in Construction Industry (Kamar, et al., 2014), 6- A fuzzy multi-criteria decision making model for construction contractor prequalification (Nieto-Morote & Ruz - Vila ,2012), 7- Contractor pre-qualification model: State-of-the-art (El-Sawalhi, et al., 2007), 8- Analysis of criteria for contractors' qualification evaluation (Banaitiene & Banaitis, 2006).

Table 2.1 : Comparisons Between the Published Pre-Qualification and Classification Criteria (Review of Criteria in Literature from 2006 to 2018)

Main Criteria	Sub - Criteria	Author							
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Health and Safety	Safety Performance	X		X		X	X	X	X
	Accountability					X	X		
	Injury and Illness	X				X		X	
Main Criteria	**Sub - Criteria**	**Author**							
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Technical ability	Experience of Staff			X	X	X	X	X	X
	Management Capability	X			X				
	Qualification of Staff				X		X	X	X
	Past Performance	X	X	X	X		X	X	X
	Quality Performance				X		X		
	Company Organization					X	X	X	
	Innovate Method		X				X		
Quality	Quality Control			X				X	
	Quality Policy							X	
	Quality Assurance			X				X	X
Financial stability	Credit Rating		X		X		X	X	
	Turnover				X			X	
	Bank Arrangement							X	X
	Debit Ratio							X	X
	Liquidity						X	X	

Resources	Profitability							X	
	Equipment					X	X	X	
	Number of Staff			X		X	X		X
	Company Image		X					X	
Performance	Skilled Manpower	X							
	Client Satisfaction							X	X
	Record of Failure							X	X
	Claims and Litigation	X		X					X
Main Criteria	**Sub - Criteria**	**Author**							
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Experience	Type of Project				X		X	X	X
	Size of Project				X		X	X	X
	Number of Projects				X		X		X
	Experience in the Region	X					X	X	X
	Length of Time in Business							X	
Sum of Total Item	31	7	4	7	10	7	16	23	18
Percentage of Item	100%	23	13	23	32	23	52	74	58

The previous table 2.1 Shows a comparison was made between several studies and by different researchers from 2006 to 2018, and this comparison was made between the criteria adopted in each research and was detailed. The table contain the percentage of item, which is the percentage according to all sub-criteria for the same author.

The researcher believes that, according to the table and chart for comparison between several researches, during the years there is less interest in applying the pre-qualification and classification criteria as a whole, as we found that the highest percentage of the study was in 2007, with a rate of 74%, and the lowest percentage of the study was in 2017, That is, by 13%, within ten years. Thus, we conclude that in recent years there has been a reduction in the criteria for pre-qualification and

classification contractors, which would not reach the desired result of any project, and in our turn we will determine the necessary criteria for pre-qualification and classification and provide the necessary recommendations for that.

It's clear in the following figure 2.1, the Comparisons between the published prequalification and classification criteria (review of criteria in literature from 2006 to 2018), and show the percentage for item for each author.

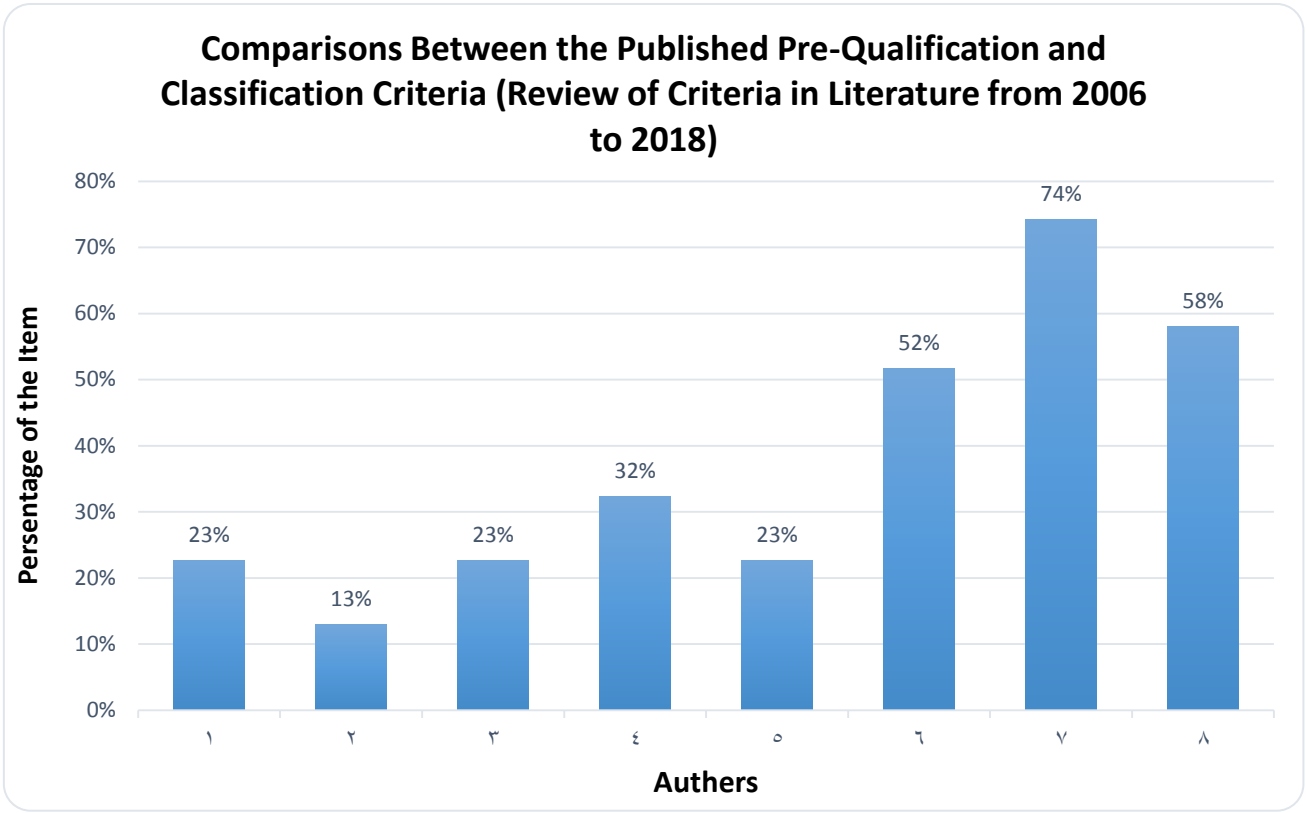

Figure 2.1 : Comparisons Between the Published Pre-Qualification and Classification Criteria (Review of Criteria in Literature from 2006 to 2018)

2.10 General Pre-Qualification and Classification of Offices Practice Around the World

In this section, some literature is reviewed on the practice of pre-qualification and classification around the world, as this would broaden our perceptions and broaden our view of this topic from more than one aspect, and in addition it would be useful for this research as it is in the same field.

2.10.1 Iraq Practice

Sawsan mahomad and Raafat Majeed (2016) have identified pre-qualification practices and criteria in Iraq, and pre-qualification criteria have been developed for them, which are present in the construction industry in government ministries and governorates.

Groups of standards were developed, and then the factors were divided into two groups, which are the sub-criteria, and the main criteria are as follows: financial soundness, technical ability, management capability, health and safety, reputation and past performance, and the data were analysed to rank these criteria, and the results showed The great importance of the pre-qualification criteria approved for contractors and includes financial standards for companies, past performance, contractor reputation and management ability of the company. Other criteria were discussed in this research and it was found that there are factors and criteria that are considered relatively low application, such as claims, contract disputes, closing account, resource and plant personnel, health and safety, quality, quality assurance, and delays in receiving work due to defects (Mohamed & Majeed, 2016).

2.10.2 Saudi Arabia Practice

Abdulaziz and kamal (2014) has identified pre-qualification practices and criteria in Saudi Arabia, pre-qualification criteria were defined in terms of standard practices by public and private organizations in Saudi Arabia. Where he aimed to verify the contractor's ability to implement the requirements of the required project.

A number of large companies were studied, and pre-qualification practices were studied. The results and criteria were compared with other countries to see their suitability (Bubshait & AL-Gobali, 2014).

It found that the most important criteria are: contractor experience, financial stability, past performance, quality, project management, project failure records, availability of management personnel, and contractor capacity (Bubshait & AL-Gobali, 2014).

2.10.3 Ghanaian Practice

Daniel and Humphrey (2018) in this study examines the criteria for selecting a contractor in the Ghanaian construction industry, taking into account the benefits and challenges. The study was drawn from registered contractors and consultants in the Ashanti and Prung Ahavu regions of Ghana.

It was also found that the advantages of the contractor's selection criteria include: enabling the client to select the contractors performing the project, saving a lot of time on the project owner, reducing the likelihood of

contractor failure, and facilitating the success of the project and objectives within time (Ayettey & Danso, 2018).

Furthermore, excess cost and time overruns, poor quality standards, inaccurate assessments due to lack of information, standards are extremely complex and difficult to apply in practice, among other things identified as challenges to contractor selection criteria in ghana's construction industry (Ayettey & Danso, 2018) .

Several criteria have been dealt with: financial stability evaluation method, Management and technical ability evaluation method, Contractor's experience evaluation method, Contractor's past performance method, Plant and human resource evaluation method, also health and safety and environmental measures method (Ayettey & Danso, 2018).

The study recommends further studies to determine the impact of the challenges identified on construction projects, and ways to reduce challenges (Ayettey & Danso, 2018).

2.10.4 Mexico Practice

David, Nora and Luis (2015) This article talks about the results of a research study conducted at two construction sites in Hermosillo, Sonora in Mexico. This research aims to identify and evaluate occupational risks in their activities. With the purpose of demonstrating the importance of including occupational health practices in management systems, they are likely to prevent, reduce and / or eliminate occupational hazards and risks in building construction activities.

In this article, this researcher concluded that there is a poor use of occupational safety and health practices in the construction project process at all stages from the project planning stage to the implementation of the works (Quintana, et al., 2015).

An assessment of occupational risks and standards, including Mexican chemical and physical hazards, was conducted, and through these assessments it was demonstrated that there is a need to integrate occupational health and safety practices into the safety management system. This means that the tasks performed daily in construction can be harmful to the health and well-being of workers. Basically, the contractor was not selected based on correct and specific standards of occupational safety and health standards, and this would lead to the wrong and inappropriate selection of the contractor (Quintana, et al., 2015).

2.10.5 Malaysia Practice

Sulastre and Faridah (2011) this research paper talked about the need to provide a certain safety behaviour, and to improve the performance of occupational safety in the construction industry. This paper has argued for

the need for safety behaviour as higher momentum of employers towards identified factors is agreed by several researchers to help the organization continuously improve safety compliance and safety performance in the construction industry. Employers, contractors and employees of good safety conduct play a particularly important role in achieving safety compliance in occupational improvement safety and health in the construction industry (Zin & Ismail, 2012). Studies have shown that the introduction of safety compliance factors and standards for employers and contractors and their enhancement by employers for employees are needed in order to achieve the organization's goals and eliminate construction accidents (Zin & Ismail, 2012).

Active participation of identified behavioural safety compliance will lead to greater influence among employees and improved safety behaviour (Zin & Ismail, 2012).

2.11 Commentary on Previous Studies and Studies Applied in Some Countries Regarding to the Pre-Qualification and Classification of Engineering Offices.

By reviewing previous studies in the process of pre-qualification and classification of engineering offices, which are applied in some countries of the world, it has been observed that each country has its own methods of pre-qualification and classification, these methods tried to fit the local conditions in those countries from several aspects and were represented by economic, political considerations working conditions and workers, social and cultural aspects.

The researcher believes, through previous studies carried out in some countries of the world, that there is no interest in matters of occupational safety and health in the field of construction, and that there is weakness in this aspect at various levels, which would cause catastrophic problems, whether health or material in Projects.

Therefore, it was necessary to conduct several studies to shed light on this issue and its importance in the field of construction. It can be considered this study will contribute in the future to improving the pre-qualification and classification decision for contractors, by setting criteria for pre-qualification and classification that include the issue of occupational safety and health, and thus obtaining higher quality projects which will positively affect society in general.

According to previous literature review about pre-qualification and classification engineering offices in field health and safety occupational, we conclude criteria shows in table 2.2.

Table 2.2: The Criteria from Literature Review for Pre-Qualification and Classification

NO.	Criteria	Authors
1	Past Performance	(Ayettey & Danso , 2018), (Stević , 2017), (Mohamed & Majeed, 2016), (Lesniak , 2015),(Nieto-Morote & Ruz-Vila ,2012), (El-Sawalhi, et al., 2007), (Banaitiene & Banaitis, 2006).
2	Experience of Staff	(Mohamed & Majeed, 2016), (Lesniak , 2015), (Kamar, et al., 2014), (Nieto-Morote & Ruz-Vila ,2012), (El-Sawalhi, et al., 2007), (Banaitiene & Banaitis, 2006).
3	Safety Performance	(Ayettey & Danso , 2018), (Mohamed & Majeed, 2016), (Kamar, et al., 2014), (Nieto-Morote & Ruz-Vila ,2012), (El-Sawalhi, et al., 2007), (Banaitiene & Banaitis, 2006).
4	Qualification of Staff	(Lesniak , 2015), (Nieto-Morote & Ruz-Vila ,2012), (El-Sawalhi, et al., 2007), (Banaitiene & Banaitis, 2006).
5	Credit Rating	(Stević , 2017), (Lesniak , 2015),(Nieto-Morote & Ruz-Vila ,2012), (El-Sawalhi, et al., 2007).
6	Experience in the Region	(Ayettey & Danso , 2018), (Nieto-Morote & Ruz-Vila ,2012), (El-Sawalhi, et al., 2007), (Banaitiene & Banaitis, 2006).
7	Size of Project	(Lesniak , 2015), (Nieto-Morote & Ruz-Vila ,2012), (El-Sawalhi, et al., 2007), (Banaitiene & Banaitis, 2006).
8	Type of Project	(Lesniak , 2015), (Nieto-Morote & Ruz-Vila ,2012), (El-Sawalhi, et al., 2007), (Banaitiene & Banaitis, 2006).
9	Number of Staff	(Lesniak , 2015), (Nieto-Morote & Ruz-Vila ,2012), (Banaitiene & Banaitis, 2006).
10	Equipment	(Kamar, et al., 2014), (Nieto-Morote & Ruz-Vila ,2012), (El-Sawalhi, et al., 2007).
11	Claims and Litigation	(Ayettey & Danso , 2018), (Mohamed & Majeed, 2016), (Banaitiene & Banaitis, 2006).
12	Number of Projects	(Lesniak , 2015), (Nieto-Morote & Ruz-Vila ,2012), (Banaitiene & Banaitis, 2006).
13	Quality Assurance	(Mohamed & Majeed, 2016), (El-Sawalhi, et al., 2007), (Banaitiene & Banaitis, 2006).
14	Company Organization	(Kamar, et al., 2014), (Nieto-Morote & Ruz-Vila ,2012), (El-Sawalhi, et al., 2007).
15	Injury and Illness	(Ayettey & Danso , 2018), (Kamar, et al., 2014), (El-Sawalhi, et al., 2007).
16	Bank Arrangement	(El-Sawalhi, et al., 2007), (Banaitiene & Banaitis, 2006).
17	Turnover	(Kamar, et al., 2014), (El-Sawalhi, et al., 2007).
18	Record of Failure	(El-Sawalhi, et al., 2007), (Banaitiene & Banaitis, 2006).

CHAPTER THREE
DESIGN AND METHODOLOGY

3.1 Introduction

This chapter describes the methodology that used in this research. It includes the research strategy, population of research, sample type, sample size, questionnaire design and contents, and the statistical analyzes that were adopted in analyzing the results of questionnaire.

3.2 Research Strategy

In order to collect the information necessary to evaluate the criteria for pre-qualification and classification of engineering offices and to achieve the aims of this research, the study included the quantitative and qualitative exploratory methods (Tarawneh, 2004).

The research methodology included the following research tools:

1. Theoretical scientific study of previous studies (literature review): a study of research related to the issues of pre-qualification and classification criteria and study of the experiences of different countries in prequalification for engineering offices and the determination of pre-qualification standards and criteria for pre-qualification of engineering offices in the field of safety and occupational health used in Many countries.
2. Conduct systematic interviews with project management experts and workers in the field of engineering and owners of engineering offices who have extensive experience in pre-qualification.
3. Design questionnaire: Based on the theoretical review, the questionnaire will be designed on the criteria to be followed in prequalification for engineering offices in the field of occupational safety and health. And after determining the list of criteria that will be used in this research, a questionnaire will be designed to know the relative importance of each of the prequalification criteria from least important to most important.
4. All data collected will analysed using a statistical package for social sciences (SPSS).

The following Figure 3.1 shows the research strategy flowchart, that's leads to achieve the research.

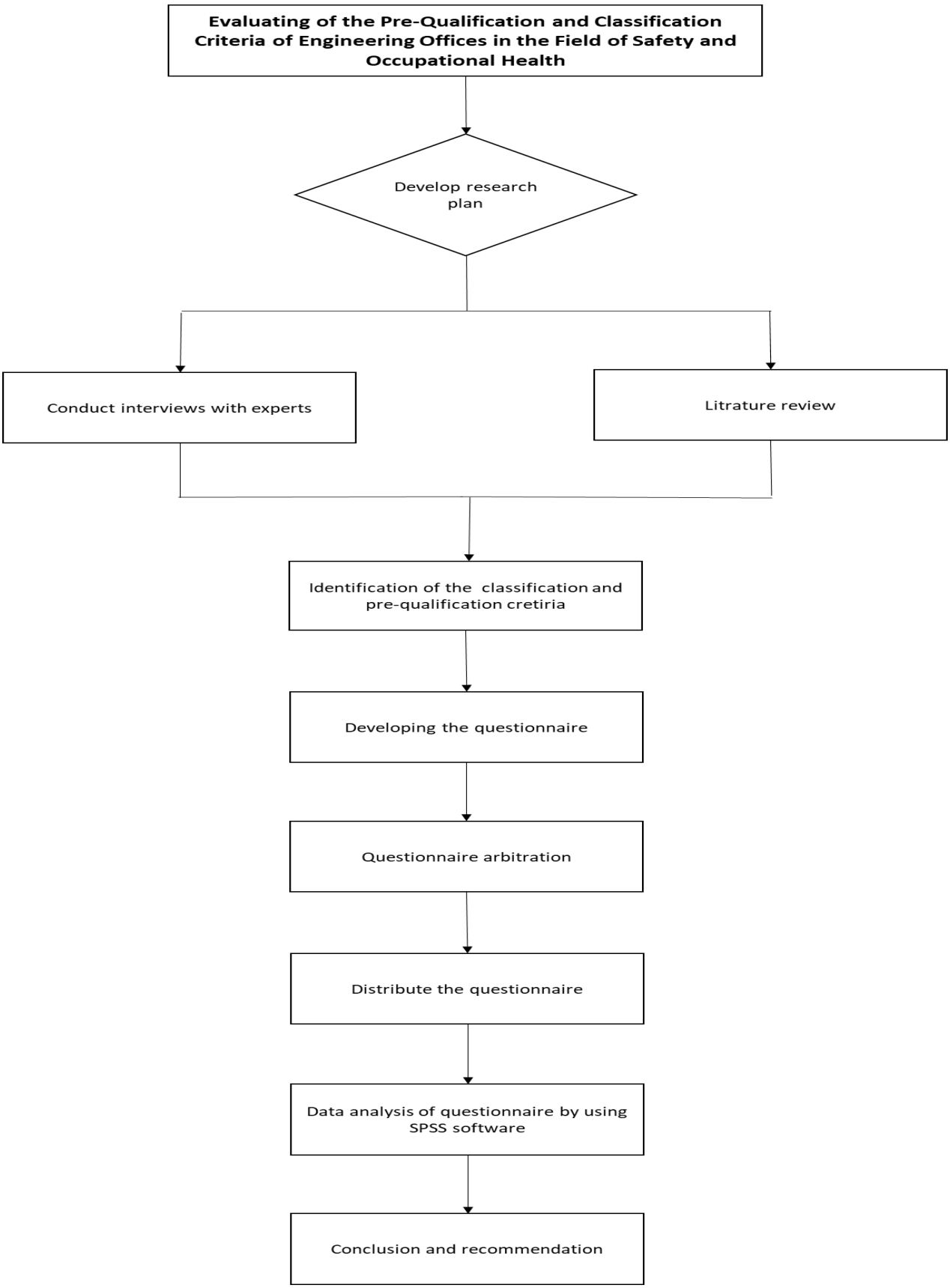

Figure 3.1 : Research Strategy Flowchart

3.3 Population of the Research

Population of research consists of the engineers working in the institutions that own projects in Jordan who are specialized in evaluating the consulting offices, as well as the managers of some projects, also the population includes the owners of the consulting offices in Jordan classified with the Office Authority, see Appendix 5.

3.4 Sample Type

Non- probability sampling (purposive or judgment sampling), it is a deliberate choice to take a sample that meets some of the pre-determined criteria, and to take samples as more appropriate to the specific study.

3.5 Sample Size

The study sample was calculated based on the following equation (Thompson, 2012):

$$n = \frac{Np(1-p)}{(N-1) * \left(\frac{d^2}{z^2}\right) + p(1-p)} \tag{3.1}$$

Where:
N: Population size.
Z: Standard score corresponding to the level of significance 0.05 and level of confidence 95% equal 1.96.
d: Margin of error 5%.
p: The probability value.

The number of engineering offices operating in Jordan until the end of February 2020 was 1242 engineering offices and companies, see Appendix 5.

Based on this number for engineering offices which is 1242, and with confidence level 95%, and margin 5%, the sample size will be 294.

$$n = \frac{(1242 * 0.5)(1-0.5)}{(1242-1) * \left(\frac{0.05^2}{1.96^2}\right) + 0.5(1-0.5)} = 294$$

The following figure 3.2 shows the number of engineering offices until the end of February 2020.

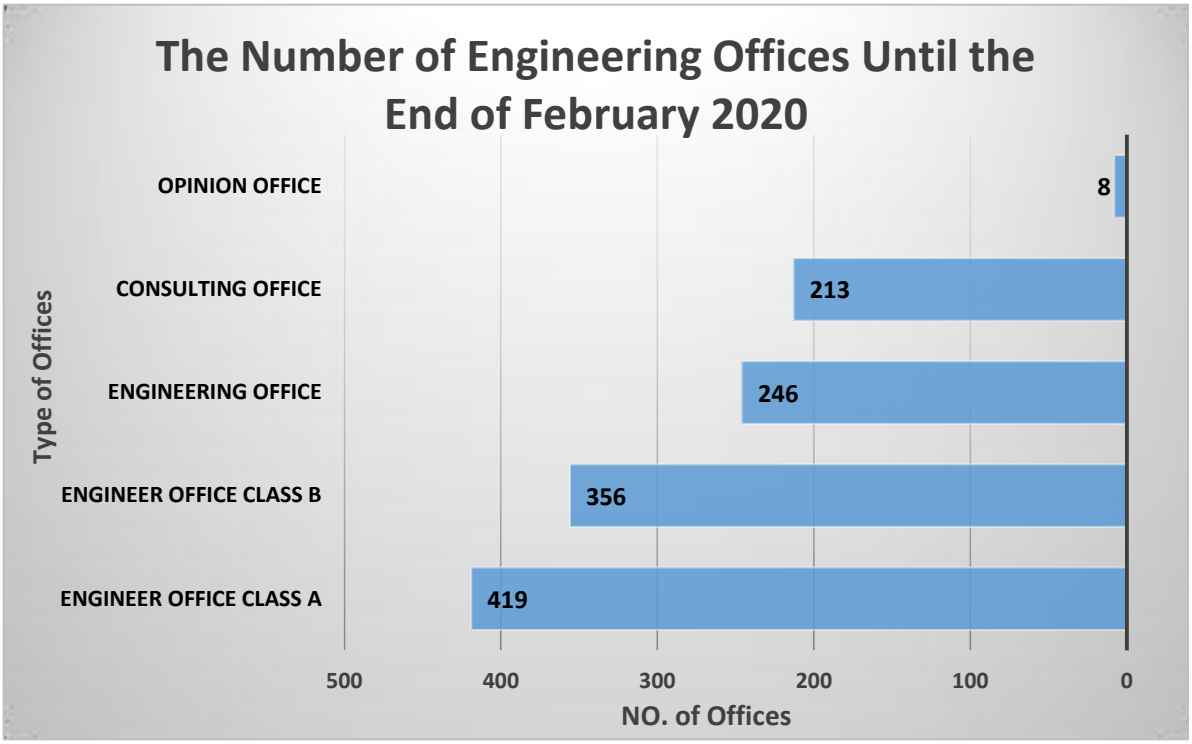

Figure 3.2: The Number of Engineering Offices Until the End of February 2020

3.6 Questionnaires Design and Contents

The questionnaire was designed based on the ideas extracted from the literature review; in particular, from previous studies related to the subject of this research.

In addition, the researcher conducted interviews with 9 experts in the field of occupational safety and health, as well as in the field of pre-qualification and classification of engineering offices, see Appendix 2.

The questionnaire is designed to fulfil the requirements of the research objectives. Where all information that could help in achieving the study objectives was collected, revised and formalized to be suitable for the study survey. The researcher used the questionnaire as a tool to collect primary data directly related to this study.

After that, the researcher presented the questionnaire to 5 of the specialized arbitrators, and all of them responded, see Appendix 1. some of whom are on the academic side in the field of engineering management, the field of occupational safety and health, the statistical field and the engineering field especially in occupational safety and health. The author asked them to verify the suitability of the criteria presented in the questionnaire, and whether the phrases in its current formulation give the required meaning or not, with the addition or modification of what they deem appropriate, as some of the repeated questions have been deleted and some merged, and some of others amended, in addition to setting new

criteria. The observations made by the arbitrators were amended, as these amendments were necessary and were taken after the supervisor's instructions, and as a result we obtained a proposed questionnaire for the classification criteria and pre-qualification of engineering offices in the field of occupational safety and health, so that it covers aspects related to the classification and pre-qualification process. In terms of technical, financial, organizational and general requirements.

The questionnaire was divided into two parts as follows:

1. The first section it contains seven questions, which are general information about the respondents in terms of academic qualification and job description for them, their practical experience in the engineering field and practical experiences in the field of occupational safety and health, as well as about the respondents' organizations in terms of the value of the projects implemented in the company and Years of company experience.
2. The second section it consists of thirty-four questions. The questions were divided and classified into four groups related to the main standards adopted. Each group includes relevant factors to determine its importance from the point of view of decision-makers and their representatives in relation to the classification process and pre-qualification in the field of safety and health. Also, each group contains a negative question from among the attached questions in each group, so that the total of the negative questions are four, in order to ensure the validity of the respondents in answering the questionnaire, and the distribution of the questions was as follows: the questions from (1-7) within the first group, which is the technical requirements, and the questions from (8 -13) was in the second group, which is the financial condition for occupational safety and health, the questions from (14 -24) which is the regulation in the field of occupational safety and health group, and the questions from (25 -34) which is the general requirements for occupational safety and health group.

All questions follow a Likert scale which gives numerical values ranging from five to one for the significance of each factor ranging from very important to insignificant respectively. The questionnaire survey was conducted to determine the point of view of the studied community sample regarding the classification and pre-qualification process in the field of occupational safety and health in engineering offices. The questionnaire was designed with an appropriate cover letter, and it was prepared and distributed to the study population.

The questionnaire was prepared in "Arabic" and in 'English', in order to avoid any misunderstanding of the questionnaire. A copy of the questionnaire in Arabic and English is attached, see Appendix 3, and Appendix 4.

CHAPTER FOUR
DISCUSSIONS, CONCLUSIONS AND RECOMENDATIONS

4.1 Introduction

In this chapter, the results of the field survey are presented and discussed. And this chapter also presents the conclusions and recommendations of the pre-qualification and classification criteria research Recommendations for further studies are also included.

4.2 Reliability

To calculate and measure the reliability of the study tool (the questionnaire), the researcher used the (Alpha Cronbach equation) to ensure the reliability of the study tool on an exploratory sample consisting of (30), which was excluded from the total sample, and table 4.1 shows the parameters of the stability of the study tool:

Table 4.1: Cronbach's Alpha Coefficients

NO.	Dimensions	Cronbach Alpha
1	Technical Conditions for Occupational Safety and Health.	0.823
2	Financial Conditions for Occupational Safety and Health.	0.834
3	Regulation in the Field of Occupational Safety and Health.	0.886
4	General Requirements for Occupational Safety and Health.	0.822
Total	**—**	**0.918**

It is clear from Table 4.1 that the general reliability coefficient for the study categories is high, reaching (0.918) for the total of the four categories of the questionnaire, while the reliability of the categories ranged between (0.822) as a minimum and (0.886) as a maximum. This indicates that the questionnaire has a high degree of reliability can be relied upon in the field application of the study according to the Nunnally scale, which was adopted as 0.70 as a minimum reliability (Nunnally & Bernstein, 1994).

4.3 Internal Consistency

The validity of the internal consistency of the questionnaire was verified by calculating the Pearson correlation coefficient between the degrees of each questions of the four categories and the total degrees of the category to which the question belongs, using the SPSS version 22 statistical program, and the following table shows the correlation coefficients between each question of the first category questions and the total degree of the categories.

Table 4.2: Correlation Between Question from (1 - 7) with Technical Conditions for Occupational Safety and Health

Questions	Pearson Correlation	Significant (2-Tailed)
1	.525	0.003
2	.788	0.000
3	.714	0.000
4	.910	0.000
5	.753	0.000
6	.800	0.000
7	.587	0.001

From the results of the table 4.2, we find that all Pearson correlation coefficients between the questions of the first category from question 1 to question 7, and the total degree of the first category are statistically significant at the level of 0.05 significance, where the minimum correlation coefficients were 0.525 while the highest correlation coefficients were 0.910.

According to Nunnally & Bernstein (1994) Therefore, all the questions of the first category are internally consistent with the category to which they belong, which proves the sincerity of the internal consistency of the questions of the first category.

Table 4.3 :Correlation Between Question from (8 - 13) with Financial Conditions for Occupational Safety and Health

Questions	Pearson Correlation	Significant (2-Tailed)
8	.773	0.000
9	.865	0.000
10	.705	0.000
11	.835	0.000
12	.748	0.000
13	.718	0.000

From the results of the table 4.3, we find that all Pearson correlation coefficients between the questions of the second category from question 8 to question 13, and the total degree of the second category are statistically significant at the level of 0.05 significance, where the minimum correlation coefficients were 0.705 while the highest correlation coefficients were 0.865. Therefore, all the questions of the second category are internally consistent with the category to which they belong, which proves the sincerity of the internal consistency of the questions of the second category.

Table 4.4: Correlation Between Question from (14 - 24) with Regulation in the Field of Occupational Safety and Health

Questions	Pearson Correlation	Significant (2-Tailed)
14	.831	0.000
15	.690	0.000
16	.765	0.000
17	.678	0.000
18	.800	0.000
19	.754	0.000
20	.870	0.000
21	.783	0.000
22	.511	0.004
23	.634	0.000
24	.520	0.003

From the results of the table 4.4, we find that all Pearson correlation coefficients between the questions of the third category from question 14 to question 24, and the total degree of the third category are statistically significant at the level of 0.05 significance, where the minimum correlation coefficients were 0.511 while the highest correlation coefficients were 0.870.
Therefore, all the questions of the third category are internally consistent with the category to which they belong, which proves the sincerity of the internal consistency of the questions of the third category.

Table 4.5 :Correlation Between Question from (25 - 34) with General Requirements for Occupational Safety and Health

Questions	Pearson Correlation	Ssignificant (2-Tailed)
25	.618	0.000
26	.495	0.005
27	.828	0.000
28	.712	0.000
29	.366	0.046
30	.514	0.004
31	.742	0.000
32	.671	0.000
33	.801	0.000
34	.697	0.000

From the results of the table 4.5, we find that all Pearson correlation coefficients between the questions of the forth category from question 25 to question 34, and the total degree of the forth category are statistically significant at the level of 0.05 significance, where the minimum correlation coefficients were 0.366 while the highest correlation coefficients were 0.828.
Therefore, all the questions of the forth category are internally consistent with the category to which they belong, which proves the sincerity of the internal consistency of the questions of the forth category.
Accordingly, through the results of reliability and internal consistency in the previous tables, it becomes clear to us that the study tool (questionnaire) has a high degree of reliability and its internal consistency, which makes us apply it to the entire sample.

4.4 Details of Sample Study

Tables and figures shows the demographic data of the survey.

Table 4. 6: Details of Gender

NO.	Demographic Variable	Frequency	Percentage %
1	Male	183	62.2%
	Female	111	37.8%

From table 4.6, we found the highest percent of total sample were male by 62.2 %, while female was 37.8 % of the total sample.

Table 4.7: Details of the Education Level

NO.	Demographic Variable	Frequency	Percentage %
2	Diploma	4	1.4%
	Bachelor	210	71.4%
	Master	50	17.0%
	PhD	30	10.2%

From table 4.7, we found the highest percent of total sample for education level were (Bachelor) by 71.4 %, followed by (Master) with 17.0 % of the total sample, while 10.2 % of the total sample were (PhD), and the lowest percent 1.4 % for (Diploma) from total sample.

Table 4.8: Details the Size of the Projects that have been Implemented Through your Organization During the Past Five Years (JD)

NO.	Demographic Variable	Frequency	Percentage %
3	Less than 10 Thousand	6	2.0%
	More than 10 Thousand - Less than 100 Thousand	47	16.0%
	More than 100 Thousand - Less than 1 Million	98	33.3%
	More than 1 Million	143	48.6%

From table 4.8, we found the highest percent of total sample for the Size of the Projects that have been Implemented Through your Organization During the Past Five Years were (More than 1 million) by 48.6 %, followed by (More than 100 thousand - less than 1 million) with 33.3 % of the total sample, while 16.0 % of the total sample were (More than 10 thousand - less than 100 thousand), and the lowest percent 2.0 % for (Less than 10 thousand) from total sample.

Table 4.9: Details of the Most Appropriate Description of the Nature of your Work in the Organization in Which You Work

NO.	Demographic Variable	Frequency	Percentage %
4	Project Manager	77	26.2%
	Supervising Engineer	122	41.5%
	Consultant	90	30.6%
	Other	5	1.7%

From table 4.9, we found the highest percent of total sample for the Most Appropriate Description of the Nature of your Work in the Organization in Which You Work were (Supervising engineer) by 41.5 %, followed by (Consultant) with 30.6 % of the total sample, while 26.2 % of the total sample were (Project manager), and the lowest percent 1.7 % for (Other) from total sample.

Table 4.10: Details of the Years of Practical Experience in the Engineering Feld

NO.	Demographic Variable	Frequency	Percentage %
5	Less than One Year	4	1.4%
	More than 1 Year - Less than 3 Years	26	8.8%
	More than 3 Years - Less than 10 Years	104	35.4%
	More than 10 Years	160	54.4%

From table 4.10, we found the highest percent of total sample for the years of practical experience in the engineering field were (More than 10 years) by 54.4 %, followed by (More than 3 years - less than 10 years) with 35.4 % of the total sample, while 8.8 % of the total sample were (More than 1

year - Less than 3 years), and the lowest percent 1.4 % for (less than one year) from total sample.

Table 4.11: Details of the Years of Experience in Public Safety and Occupational Health

NO.	Demographic Variable	Frequency	Percentage %
6	Less than One Year	16	5.4%
	More than 1 Year - Less than 3 Years	96	32.7%
	More than 3 Years - Less than 10 Years	131	44.6%
	More than 10 Years	51	17.3%

From table 4.11, we found the highest percent of total sample for the years of experience in public safety and occupational health were (More than 3 years - less than 10 years) by 44.6 %, followed by (More than 1 year - Less than 3 years) with 32.7 % of the total sample, while 17.3 % of the total sample were (More than 10 years and the lowest percent 5.4 % for (less than one year) from total sample.

Table 4.12: Details of the Years of Experience are the Office in Which You Work

NO.	Demographic Variable	Frequency	Percentage %
7	Less than One Year	2	0.7%
	More than 1 Year - Less than 3 Years	24	8.2%
	More than 3 Years - Less than 10 Years	103	35.0%
	More than 10 Years	165	56.1%

From table 4.12, we found the years of experience are the office in which you work were (More than 10 years) by 56.1%, followed by (More than 3 years - less than 10 years) with 35.0 % of the total sample, while 8.2 % of the total sample were (More than 1 year - Less than 3 years) and the lowest percent 0.7 % for (less than one year) from total sample.

4.5 Descriptive Statistics

Table 4.13: Details of the Frequencies and Parsentages of Sample Size for Technical Conditions for Occupational Safety and Health.

No.	Criteria		Very Important	Important	Natural	Of little Importance	Not Important
1	Academic qualification in the field of occupational safety and health for supervisors.	N	170	87	33	4	0
		%	57.8%	29.6%	11.2%	1.4%	0.0%
2	Certified professional certificate in the field of occupational safety and health for project managers, team leaders and officials within the engineering office.	N	130	131	30	2	1
		%	44.2%	44.6%	10.2%	0.7%	0.3%
3	A training course of not less than 30 hours in the field of occupational safety and health.	N	121	140	30	2	1
		%	41.2%	47.6%	10.2%	0.7%	0.3%
4	Head of specialization (an engineer licensed to practice the profession of occupational safety and health and assigned with the tasks of supervising it).	N	103	132	57	2	0
		%	35.0%	44.9%	19.4%	0.68%	0.0%
5	Practical experience in the field of occupational safety and health of not less than 3 years for an engineer office class (b) or an engineering company category an engineering office.	N	97	139	55	2	1
		%	33.0%	47.3%	18.7%	0.7%	0.3%
6	Practical experience in the field of occupational safety and health of not less than 5 years for a class (A) engineer office or a class 3 engineering company.	N	87	158	43	4	2
		%	29.6%	53.7%	14.6%	1.4%	0.7%
7	Lack of training programs on occupational safety and health topics.	N	2	0	50	79	163
		%	0.7%	0.0%	17.0%	26.9%	55.4%

It is clear from the table 4.13 the frequencies and percentages of the responses of the study sample about the first category (Technical conditions for occupational safety and health), where the total of the respondents (Very important) with the paragraph (Academic qualification in the field of occupational safety and health for supervisors) of 170 out of 294 persons, with percentage 57.8 % out of the sample, and the highest number of respondents (Important) are the paragraph (Practical experience

in the field of occupational safety and health of not less than 5 years for a class (A) engineer office or a class 3 engineering company) was obtained by 158 respondents, and the highest number of respondents (Natural) are the paragraph (Head of specialization (an engineer licensed to practice the profession of occupational safety and health and assigned with the tasks of supervising it)) was obtained by 57 responds, and the and the majority of the response to (of little important and not important) was for the negative question of the category one (Lack of training programs on occupational safety and health topics).

Table 4.14: Details of the Frequencies and Parsentages of Sample Size for Financial Conditions for Occupational Safety and Health.

NO.	Criteria		Very Important	Important	Natural	Of little Importance	Not Important
8	The financial liquidity of the engineering office.	N	137	111	38	7	1
		%	46.6%	37.8%	12.9%	2.4%	0.3%
9	The annual financial volume of the engineering office.	N	112	121	54	6	1
		%	38.1%	41.2%	18.4%	2.0%	0.3%
10	The capital of the engineering office.	N	123	118	49	3	1
		%	41.8%	40.1%	16.7%	1.0%	0.3%
11	The size of the debts of the engineering office.	N	128	108	49	6	3
		%	43.5%	36.7%	16.7%	2.0%	1.0%
12	Bank facilities obtained by the engineering office.	N	129	122	33	7	3
		%	43.9%	41.5%	11.2%	2.4%	1.0%
13	Obstacles while obtaining banking services.	N	1	0	26	64	203
		%	0.3%	0.0%	8.8%	21.8%	69.0%

Table 4.14 shows the frequencies and percentages of the responses of the study sample about the second category (Financial conditions for occupational safety and health), where the total of the respondents (Very important) with the paragraph (The financial liquidity of the engineering office) of 137 out of 294 persons, with percentage 46.6 % out of the sample, and the highest number of respondents (Important) are the paragraph (Bank facilities obtained by the engineering office) was obtained by 122 respondents, and the highest number of respondents (Natural) are

the paragraph (The annual financial volume of the engineering office t) was obtained by 54 responds, and the and the majority of the response to (of little important and not important) was for the negative question of the category one (Obstacles while obtaining banking services).

Table 4.15: Details of the Frequencies and Parsentages of Sample Size for Regulation in the Field of Occupational Safety and Health

No.	Criteria		Very Important	Important	Natural	Of little Importance	Not Important
14	Documentation of the objectives of occupational safety and health in the engineering office.	N	111	142	39	2	0
		%	37.8%	48.3%	13.3%	0.7%	0
15	The existence of an organizational structure that defines the role of workers and those responsible for occupational safety and health in the engineering office.	N	106	154	30	4	0
		%	36.1%	52.4%	10.2%	1.4%	0
16	Providing a list of the major risks related to occupational safety and health arising from the activities of the engineering office.	N	112	135	46	1	0
		%	38.1%	45.9%	15.6%	0.3%	0
17	Create records for the type of accidents related to work.	N	110	148	35	1	0
		%	37.4%	50.3%	11.9%	0.3%	0
18	Establishing records of the type of work-related injuries.	N	105	142	46	1	0
		%	35.7%	48.3%	15.6%	0.3%	0
19	Create records of work-related fatal accidents.	N	102	148	41	3	0
		%	34.7%	50.3%	13.9%	1.0%	0
20	Establishing engineering office success records in implementing projects.	N	109	138	45	2	0
		%	37.1%	46.9%	15.3%	0.7%	0
21	Create records of failure of the engineering office to implement projects.	N	100	138	46	6	4
		%	34.0%	46.9%	15.6%	2.0%	1.4%
22	The ability to supervise and monitor.	N	123	119	45	7	0
		%	41.8%	40.5%	15.3%	2.4%	0
23	Work to spread preventive culture and awareness of the importance of occupational safety and health.	N	103	157	30	3	1
		%	35.0%	53.4%	10.2%	1.0%	0.3%
24	It is not important to document occupational safety and health objectives within the engineering office.	N	0	0	71	38	185
		%	0	0	24.1%	12.9%	62.9%

Table 4.15 shows the frequencies and percentages of the responses of the study sample about the second category (Regulation in the field of occupational safety and health.), where the total of the respondents (Very important) with the paragraph (The ability to supervise and monitor) of 123 out of 294 persons, with percentage 41.8 % out of the sample, and the highest number of respondents (Important) are the paragraph (Work to spread preventive culture and awareness of the importance of occupational safety and health) was obtained by 157 respondents, and the and the majority of the response to (Natural ,Of little important and not important) was for the negative question of the category one (It is not important to document occupational safety and health objectives within the engineering office).

Table 4.16: Details of the Frequencies and Parsentages of Sample Size for General Requirements for Occupational Safety and Health.

No.	Criteria		Very Important	Important	Natural	Of little Importance	Not Important
25	Services provided by the engineering office.	N	107	144	41	2	0
		%	36.4%	49.0%	13.9%	0.7%	0
26	The size of projects implemented by the engineering office in the field of occupational safety and health.	N	99	150	42	3	0
		%	33.7%	51.0%	14.3%	1.0%	0
27	The number of projects implemented by the engineering office in the field of occupational safety and health.	N	109	127	51	7	0
		%	37.1%	43.2%	17.3%	2.4%	0
28	Experience of the Engineering Office in implementing projects in the field of occupational safety and health.	N	118	135	35	4	2
		%	40.1%	45.9%	11.9%	1.4%	0.7%
29	Membership in unions (for engineers and project managers).	N	73	155	47	15	4
		%	24.8%	52.7%	16.0%	5.1%	1.4%
30	Failure to provide lists of services provided by the engineering office.	N	2	0	40	77	175
		%	0.7%	0	13.6%	26.2%	59.5%
31	The number of projects currently implemented by the engineering office.	N	95	126	64	9	0

		%	32.3%	42.9%	21.8%	3.1%	0
32	Type of current projects implemented by the engineering office.	N	91	116	81	6	0
		%	31.0%	39.5%	27.6%	2.0%	0
33	The number of equipment and tools owned by the engineering office.	N	103	134	44	12	1
		%	35.0%	45.6%	15.0%	4.1%	0.3%
34	Quality of equipment and tools owned by the engineering office.	N	150	90	40	11	3
		%	51.0%	30.6%	13.6%	3.7%	1.0%

Table 4.16 shows the frequencies and percentages of the responses of the study sample about the second category (General requirements for occupational safety and health), where the total of the respondents (Very important) with the paragraph (Quality of equipment and tools owned by the engineering office) of 150 out of 294 persons, with percentage 51.0 % out of the sample, and the highest number of respondents (Important) are the paragraph (Membership in unions (for engineers and project managers).) was obtained by 155 respondents, and the highest number of respondents (Natural) are the paragraph (Type of current projects implemented by the engineering office) was obtained by 81 responds, and the and the majority of the response to (Of little important and not important) was for the negative question of the category one (Failure to provide lists of services provided by the engineering office).

Table 4.17: Details of the Mean and Standard Deviation and Rank of Sample Size for Technical Conditions for Occupational Safety and Health.

No.	Criteria	Mean	Std. Deviation	Rank
1	Academic qualification in the field of occupational safety and health for supervisors.	4.439	0.744	1
2	Certified professional certificate in the field of occupational safety and health for project managers, team leaders and officials within the engineering office.	4.316	0.710	2
3	A training course of not less than 30 hours in the field of occupational safety and health.	4.286	0.701	3
4	Head of specialization (an engineer licensed to practice the profession of occupational safety and health and assigned with the tasks of supervising it).	4.143	0.744	4
5	Practical experience in the field of occupational safety and health of not less than 3 years for an engineer office class (b) or an engineering company category an engineering office.	4.119	0.750	5
6	Practical experience in the field of occupational safety and health of not less than 5 years for a class (A) engineer office or a class 3 engineering company.	4.102	0.741	6
7	Lack of training programs on occupational safety and health topics.	1.636	0.810	7
	Weighted Mean		**3.863**	
	Std. Deviation		**0.742**	

Table 4.17 shows the mean and standard deviation of the study sample responses around the first category (Technical conditions for occupational safety and health), where the paragraph that states (Academic qualification in the field of occupational safety and health for supervisors) with a standard deviation of (0.744) came in the first rank, and a mean (4.439).

The paragraph that states (Lack of training programs on occupational safety and health topics) came in seventh rank for the same category, which is the negative question in the category, and it was a standard deviation of (0.810), and a mean (1.636). Where the weighted mean of the category is (3.863), and the standard deviation of this category is (0.742).

Table 4.18: Details of the Mean and Standard Deviation and Rank of Sample Size for Financial Conditions for Occupational Safety and Health.

No.	Criteria	Mean	Std. Deviation	Rank
8	The financial liquidity of the engineering office.	4.279	0.803	1
9	The annual financial volume of the engineering office.	4.146	0.811	5
10	The capital of the engineering office.	4.221	0.781	3
11	The size of the debts of the engineering office.	4.197	0.860	4
12	Bank facilities obtained by the engineering office.	4.248	0.824	2
13	Obstacles while obtaining banking services.	1.408	0.679	6
	Weighted Mean		**3.750**	
	Std. Deviation		**0.793**	

Table 4.18 shows the mean and standard deviation of the study sample responses around the second category (Financial conditions for occupational safety and health), where the paragraph that states (The financial liquidity of the engineering office) with a standard deviation of (0.803) came in the first rank, and a mean (4.279).

The paragraph that states (Obstacles while obtaining banking services) came in sixth rank for the same category, which is the negative question in the category, and it was a standard deviation of (0.679), and a mean (1.408).

Where the weighted mean of the category is (3.75), and the standard deviation of this category is (0.793).

Table 4.19: Details of the Mean and standard deviation and rank of sample size for Regulation in the field of occupational safety and health.

No.	Criteria	Mean	Std. Deviation	Rank
14	Documentation of the objectives of occupational safety and health in the engineering office.	4.231	0.697	3
15	The existence of an organizational structure that defines the role of workers and those responsible for occupational safety and health in the engineering office.	4.231	0.682	2
16	Providing a list of the major risks related to occupational safety and health arising from the activities of the engineering office.	4.218	0.711	5
17	Create records for the type of accidents related to work.	4.248	0.668	1
18	Establishing records of the type of work-related injuries.	4.194	0.701	8
19	Create records of work-related fatal accidents.	4.187	0.703	9
20	Establishing engineering office success records in implementing projects.	4.204	0.715	7
21	Create records of failure of the engineering office to implement projects.	4.102	0.832	10
22	The ability to supervise and monitor.	4.218	0.788	6
23	Work to spread preventive culture and awareness of the importance of occupational safety and health.	4.218	0.691	4
24	It is not important to document occupational safety and health objectives within the engineering office.	1.612	0.850	11
	Weighted Mean		**3.9694**	
	Std. Deviation		**.7307**	

Table 4.19 shows the mean and standard deviation of the study sample responses around the third category (Regulation in the field of occupational safety and health), where the paragraph that states (Create records for the type of accidents related to work) with a standard deviation of (0.668) came in the first rank, and a mean (4.248).

The paragraph that states (It is not important to document occupational safety and health objectives within the engineering office) came in eleventh rank for the same category, which is the negative question in the category, and it was a standard deviation of (0.85), and a mean (1.612).

Where the weighted mean of the category is (3.9694), and the standard deviation of this category is (0.7307).

Table 4.20: Details of the Mean and Standard Deviation and Rank of Sample Size for General Requirements for Occupational Safety and Health.

No.	Criteria	Mean	Std. Deviation	Rank
25	Services provided by the engineering office.	4.211	0.698	3
26	The size of projects implemented by the engineering office in the field of occupational safety and health.	4.173	0.701	4
27	The number of projects implemented by the engineering office in the field of occupational safety and health.	4.150	0.787	5
28	Experience of the Engineering Office in implementing projects in the field of occupational safety and health.	4.235	0.764	2
29	Membership in unions (for engineers and project managers).	3.946	0.857	9
30	Failure to provide lists of services provided by the engineering office.	1.561	0.776	10
31	The number of projects currently implemented by the engineering office.	4.044	0.815	7
32	Type of current projects implemented by the engineering office.	3.993	0.818	8
33	The number of equipment and tools owned by the engineering office.	4.109	0.827	6
34	Quality of equipment and tools owned by the engineering office.	4.269	0.905	1
	Weighted Mean		**3.8690**	
	Std. Deviation		**.7948**	

Table 4.20 shows the mean and standard deviation of the study sample responses around the third category (General requirements for occupational safety and health), where the paragraph that states (Quality of equipment and tools owned by the engineering office) with a standard deviation of (0.905) came in the first rank, and a mean (4.269).

The paragraph that states (Failure to provide lists of services provided by the engineering office) came in tenth rank for the same category, which is the negative question in the category, and it was a standard deviation of (0.776), and a mean (1.561).

Where the weighted mean of the category is (3.869), and the standard deviation of this category is (0.7948).

Table 4.21: Total Weighted Mean for all Categories

Category	Weighted Mean
Technical conditions for occupational safety and health.	3.86
Financial conditions for occupational safety and health.	3.75
Regulation in the field of occupational safety and health.	3.97
General requirements for occupational safety and health.	3.87

Table 4.21 shows the weighted means of the four categories, where the weighted means ranged between (3.75 – 3.97), where the largest weighted mean of the categories was third category (Regulation in the field of occupational safety and health) with a weighted mean (3.97), followed by the forth category (General requirements for occupational safety and health) with a weighted mean (3.87), then the first category (Technical conditions for occupational safety and health) with a weighted mean (3.86), and the last one is second category (Financial conditions for occupational safety and health) with a weighted mean (3.75).
This results shown clearly in the next figure 4.8:

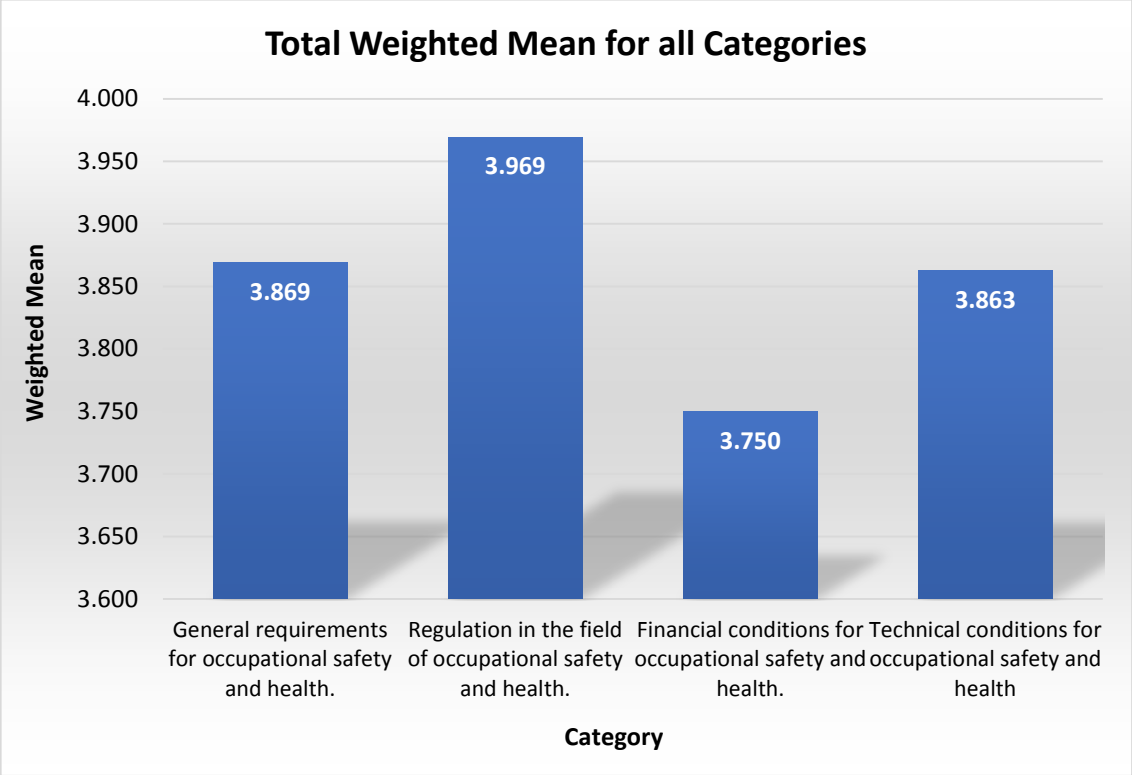

Figure 4.1: Details of the Weighted Mean

4.6 Relative Important Index (RII)

$$\text{Relative Importance Index}(RII) = \frac{\sum W}{A * N}$$, $(0 \leq RII \leq 1)$ (4.1)

Where:

W: is the weight given to each items by the respondents, range from 1 to 5, such 1 the least implying (Not Important) and the 5 the highest implying (Very Important).

A: is the highest weight (in – point Likert scale).

N: is the total number of respondents.

According to Akdiri (2011), Importance level as follow:

Table 4.22: Importance Level

RII Values	Importance Level	
$0.8 \leq RII < 1$	High	H
$0.6 \leq RII < 0.8$	High - Medium	H - M
$0.4 \leq RII < 0.6$	Medium	M
$0.2 \leq RII < 0.4$	Medium - Low	M - L
$0.0 \leq RII < 0.2$	Low	L

The table 4.22 shows the importance level according to Likert scale, which is if IRR less than 1 and more than 0.8, the importance level should be High (H), if IRR less than 0.8 and more than 0.6, the importance level should be High-Medium (H-M), if IRR less than 0.6 and more than 0.4, the importance level should be Medium (M), if IRR less than 0.4 and more than 0.2, the importance level should be Medium-Low (M-L), and if IRR less than 0.2 and more than 0.0, the importance level should be Low (L),

Table 4.23: Ranking of Criteria for the Pre-Qualification and Classification in Safety and Occupational Field in Offices

Selection Criteria	RII	Rank by Category	Overall Ranking	Important Level
▪ **Technical Conditions for Occupational Safety and Health.**				
1- Academic qualification in the field of occupational safety and health for supervisors.	0.8878	1	1	H
2- Certified professional certificate in the field of occupational safety and health for project managers, team leaders and officials within the engineering office.	0.8633	2	2	H
3- A training course of not less than 30 hours in the field of occupational safety and health.	0.8571	3	3	H
4- Head of specialization (an engineer licensed to practice the profession of occupational safety and health and assigned with the tasks of supervising it).	0.8286	4	23	H

Selection Criteria	RII	Rank by Category	Overall Ranking	Important Level
5- Practical experience in the field of occupational safety and health of not less than 3 years for an engineer office class (B) or an engineering company category an engineering office.	0.8238	5	24	H
6- Practical experience in the field of occupational safety and health of not less than 5 years for a class (A) engineer office or a consultant company.	0.8204	6	27	H
▪ **Financial Requirements for Occupational Safety and Health.**				
8- The financial liquidity of the engineering office.	0.8558	1	4	H
9- The annual financial volume of the engineering office.	0.8293	5	22	H
10- The capital of the engineering office.	0.8442	3	11	H
11- The size of the debts of the engineering office.	0.8395	4	17	H
12- Bank facilities obtained by the engineering office.	0.8497	2	7	H
▪ **Regulation in the field of occupational safety and health.**				
14- Documentation of the objectives of occupational safety and health in the engineering office.	0.8463	2	9	H
15- The existence of an organizational structure that defines the role of workers and those responsible for occupational safety and health in the engineering office.	0.8463	2	10	H
16- Providing a list of the major risks related to occupational safety and health arising from the activities of the engineering office.	0.8435	3	13	H
17- Create records for the type of accidents related to work.	0.8497	1	6	H
18- Establishing records of the type of work-related injuries.	0.8388	5	18	H
19- Create records of work-related fatal accidents.	0.8375	6	19	H
20- Establishing engineering office success records in implementing projects.	0.8408	4	16	H
21- Create records of failure of the engineering office to implement projects.	0.8204	7	26	H
22- The ability to supervise and monitor.	0.8435	3	12	H

Selection Criteria	RII	Rank by Category	Overall Ranking	Important Level
23- Work to spread preventive culture and awareness of the importance of occupational safety and health.	0.8435	3	14	H
▪ **General Requirements for Occupational Safety and Health.**				
25- Services provided by the engineering office.	0.8422	3	15	H
26- The size of projects implemented by the engineering office in the field of occupational safety and health.	0.8347	4	20	H
27- The number of projects implemented by the engineering office in the field of occupational safety and health.	0.8299	5	21	H
28- Experience of the Engineering Office in implementing projects in the field of occupational safety and health.	0.8469	2	8	H
29- Membership in unions (for engineers and project managers).	0.7891	9	30	H – M
31- The number of projects currently implemented by the engineering office.	0.8088	7	28	H
32- Type of current projects implemented by the engineering office.	0.7986	8	29	H - M
33- The number of equipment and tools owned by the engineering office.	0.8218	6	25	H
34- Quality of equipment and tools owned by the engineering office.	0.8537	1	5	H
▪ **Negative Questions**				
7- Lack of training programs on occupational safety and health topics.	0.3272	7	31	M – L
13- Obstacles while obtaining banking services.	0.2816	6	34	M - L
24- It is not important to document occupational safety and health objectives within the engineering office.	0.3224	8	32	M - L
30- Failure to provide lists of services provided by the engineering office.	0.3122	10	33	M - L

Table 4.23 shows ranking of the importance of pre-qualification and classification in the field of occupational safety and health in offices. Whereas, the relative importance index was used to distinguish between them, and three ranking were used for RII, ranking by category, overall category and importance level.

As this ranking (Ranking by category) gave top priority for:

In category one (Technical conditions for occupational safety and health) to each of: firstly, is academic qualification in the field of

occupational safety and health for supervisors, and secondly is certified professional certificate in the field of occupational safety and health for project managers, team leaders and officials within the engineering office, where the last two respectively in category one are : practical experience in the field of occupational safety and health of not less than 5 years for a class (A) engineer office or a consultant company, and the negative question for category, lack of training programs on occupational safety and health topics.

Second category (Financial conditions for occupational safety and health), the top priority gave for: firstly, is the financial liquidity of the engineering office, and secondly is bank facilities obtained by the engineering office, where the last two respectively in category two are: the annual financial volume of the engineering office, and the negative question for category, obstacles while obtaining banking services.

Third category (Regulation in the field of occupational safety and health), the top priority gave for: firstly, the financial liquidity of the engineering office, and secondly we have two criteria in same rank, documentation of the objectives of occupational safety and health in the engineering office, and the existence of an organizational structure that defines the role of workers and those responsible for occupational safety and health in the engineering office, where the last two respectively in category two are: create records of failure of the engineering office to implement projects, and the negative question for category, it is not important to document occupational safety and health objectives within the engineering office.

The last category (General requirements for occupational safety and health), the top priority gave for: firstly, quality of equipment and tools owned by the engineering office and secondly, experience of the engineering office in implementing projects in the field of occupational safety and health, where the last two respectively in category two are: membership in unions (for engineers and project managers), and the negative question for category, failure to provide lists of services provided by the engineering office.

In ranking (Ranking overall) gave top ten priority respectively for: academic qualification in the field of occupational safety and health for supervisors, certified professional certificate in the field of occupational safety and health for project managers, team leaders and officials within the engineering office, a training course of not less than 30 hours in the field of occupational safety and health, the financial liquidity of the engineering office, quality of equipment and tools owned by the engineering office, create records for the type of accidents related to work, bank facilities obtained by the engineering office, experience of the Engineering Office in

implementing projects in the field of occupational safety and health, documentation of the objectives of occupational safety and health in the engineering office, and the existence of an organizational structure that defines the role of workers and those responsible for occupational safety and health in the engineering office.

Now in ranking (importance level) gave the high level of important for all criteria accept two criteria have rank (High – Medium): membership in unions (for engineers and project managers), and for type of current projects implemented by the engineering office, and negative questions have rank (Medium – low).

4.7 Factor Analysis

The factor analysis was analyzed with 1.5 as the Eigen value to improve the force of the factors. Then, five factors were extracted. The five factors were Technical conditions for occupational safety and health, financial conditions for occupational safety and health, regulation in the field of occupational safety and health, general requirements for occupational safety and health, and negative questions.

Table 4.24: Total Variance Explained

Component	Initial Eigenvalues		
	Total of Eigenvalues	% of Variance	Cumulative %
1	8.465	24.897	24.897
2	3.626	10.663	35.560
3	3.032	8.916	44.477
4	1.946	5.724	50.201
5	1.519	4.468	54.669

Table 4.24 shows the components extracted were the Eigen values all above one, which explains 54.669% the total variance. This indicates that there could be more factors influencing when more items are generated using the expert opinions.
This results shown clearly in the next table.

Table 4.25: KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.860
Bartlett's Test of Sphericity	Approx. Chi-Square	4673.638
	df	561
	Sig.	0.000

Table 4.25 shows the KMO and Bartlett's Test. The KMO was 0.860 indicating a very good quality level based on Kaiser and Rice (1974) and

the Barlett's test for Sphericity was significant ($X^2 = 4673.638$, $P = 0.000$). The MSA was found to be above 0.7 for all 34 items (Hair et al.,2009).

Table 4.26: Component of Factor Analysis

Criteria	Component				
	1	**2**	**3**	**4**	**5**
▪ **Technical Conditions for Occupational Safety and Health.**					
1- Academic qualification in the field of occupational safety and health for supervisors.	**.639**	.193	.046	.163	.055
2- Certified professional certificate in the field of occupational safety and health for project managers, team leaders and officials within the engineering office.	**.670**	.110	.162	-.038	.020
3- A training course of not less than 30 hours in the field of occupational safety and health.	**.628**	-.122	.311	-.052	-.107
4- Head of specialization (an engineer licensed to practice the profession of occupational safety and health and assigned with the tasks of supervising it).	**.600**	.283	.188	-.032	-.122
5- Practical experience in the field of occupational safety and health of not less than 3 years for an engineer office class (B) or an engineering company category an engineering office.	**.720**	.182	.173	.035	-.108
6- Practical experience in the field of occupational safety and health of not less than 5 years for a class (A) engineer office or a consultant company.	**.720**	.225	.211	-.043	-.100
▪ **Financial Conditions for Occupational Safety and Health.**					
8- The financial liquidity of the engineering office.	.223	**.766**	.156	.099	-.025
9- The annual financial volume of the engineering office.	.230	**.776**	.201	.156	.067
10- The capital of the engineering office.	.152	**.820**	.111	.057	.009
11- The size of the debts of the engineering office.	.103	**.748**	.093	.167	-.053
12- Bank facilities obtained by the engineering office.	.084	**.788**	-.001	.085	-.167
▪ **Regulation in the Field of Occupational Safety and Health.**					
14- Documentation of the objectives of occupational safety and health in the engineering office.	.066	.124	**.731**	-.075	.041
15- The existence of an organizational structure that defines the role of workers and those responsible for occupational safety and health in the engineering office.	.198	.137	**.670**	.013	-.037
16- Providing a list of the major risks related to occupational safety and health arising from the activities of the engineering office.	.159	.092	**.695**	.022	.006
17- Create records for the type of accidents related to work.	.092	.063	**.760**	.019	-.063

18- Establishing records of the type of work-related injuries.	.143	.047	**.726**	.163	-.048
19- Create records of work-related fatal accidents.	.087	.112	**.767**	.163	.031
20- Establishing engineering office success records in implementing projects.	.146	.071	**.690**	.111	-.065
21- Create records of failure of the engineering office to implement projects.	.259	.129	**.482**	.124	-.306
22- The ability to supervise and monitor.	-.086	.033	**.562**	.219	.216
23- Work to spread preventive culture and awareness of the importance of occupational safety and health.	.081	-.085	**.651**	.250	.096
▪ **General Requirements for Occupational Safety and Health.**					
25- services provided by the engineering office.	.240	.036	.358	**.478**	-.151
26- The size of projects implemented by the engineering office in the field of occupational safety and health.	.159	.176	.432	**.434**	-.133
27- The number of projects implemented by the engineering office in the field of occupational safety and health.	.159	.203	.376	**.568**	.064
28- Experience of the Engineering Office in implementing projects in the field of occupational safety and health.	.180	.217	.351	**.566**	.016
29- Membership in unions (for engineers and project managers).	.061	.236	.244	**.276**	-.544
31- The number of projects currently implemented by the engineering office.	.030	.154	.038	**.810**	-.041
32- type of current projects implemented by the engineering office.	.001	.145	.099	**.794**	.015
33- The number of equipment and tools owned by the engineering office.	-.066	.083	-.030	**.812**	-.151
34- Quality of equipment and tools owned by the engineering office.	-.082	-.077	-.015	**.723**	-.027
▪ **Negative Questions.**					
7- Lack of training programs on occupational safety and health topics.	-.289	.114	-.073	.221	**.592**
13- Obstacles while obtaining banking services.	.028	-.171	.166	-.063	**.585**
24- It is not important to document occupational safety and health objectives within the engineering office.	-.208	.043	-.033	.168	**.573**
30- Failure to provide lists of services provided by the engineering office.	.114	.013	-.075	-.112	**.625**

Table 4.26 shows the components of factor analysis, the questionnaire which do the factor analysis for it has 34 items, after do factor analysis, the result contain 5 components, the first 6 items were categorized as Technical conditions for occupational safety and health, and items from (8 – 12) were categorized as Financial conditions for occupational safety and health, and items from (14 – 23) were categorized

as Regulation in the field of occupational safety and health, and items from (25 – 29) and from (31 – 34) were categorized as General requirements for occupational safety and health, and items NO. respectively: 7,13,24,30 were categorized as a Negative questions.

Through the previous factor analysis, the researcher found that the accuracy of the questionnaire is high, because basically he had divided the questionnaire into four parts and each question contains a negative question, and this in turn indicates the accuracy of the work and the accuracy of the division and distribution of the questions to the groups. Where, after factor analysis, 5 groups were obtained, which is like the previous division, but by adding a new group, which are the negative questions that were present in each group.

The analysis work of the questionnaire will be completed on the groups obtained through the factor analysis, and a group of negative questions will also be excluded from the following analyzes.

4.8 Statistical Analysis

This analysis aims to verify the significance of the differences between the averages of the four groups, which are as follows (Technical conditions for occupational safety and health, Financial conditions for occupational safety and health, Regulation in the field of occupational safety and health, General requirements for occupational safety and health), that were adopted through the factor analysis.

Now we test the four category with the number of years of experience in the field of occupational safety and health.

The following table shows The results of the ANOVA test according to the variable number of years of experience in the field of occupational safety and health.

Table 4.27: The Results of the ANOVA Test According to the Variable Number of Years of Experience in the Field of Occupational Safety and Health

R	.724
R Square	.524
F Value	63.383
F Significant	.000

The table 4.27 shows the results of the ANOVA analysis of variance, and from it we conclude that there are statistically significant differences between groups depending on a variable number of years of experience in the field of occupational safety and health, where the value of F is (63.383) With an indication (0.000) it is a statistically significant level of significance (0.005), and the table shows R^2 is (0.524), this means

independent variable Explanation of 52.4 % in the dependent variable, that means there is an effect of the independent variable on the dependent variable.

Table 4.28: The Results of the Multiple Linear Regression Test According to the Variable Number of Years of Experience in the Field of Occupational Safety and Health

Model	t	Sig.	Collinearity Statistics	
			Tolerance	VIF
Technical conditions for occupational safety and health.	8.635	.000	0.731	1.368
Financial conditions for occupational safety and health	13.932	.000	0.746	1.341
Regulation in the field of occupational safety and health	5.331	.000	0.670	1.493
General requirements for occupational safety and health	4.438	.000	0.705	1.418

The table 4.28 shows the results of the Multiple Linear Regression analysis, and from it we conclude that there are the collinearity statistics (VIF) for all variables are less than 10 and its between (1.341-1.493), and the tolerance between (0.670 - 0.746), so we indicate that's there is no high correlation between the factors of independent variable and nonexistent of multiple collinearity problem.

The following figure 4.2 shows the values are clustered around the mean, and this is an indication that it follows normality and this it is clear that residual follows the normal distribution.

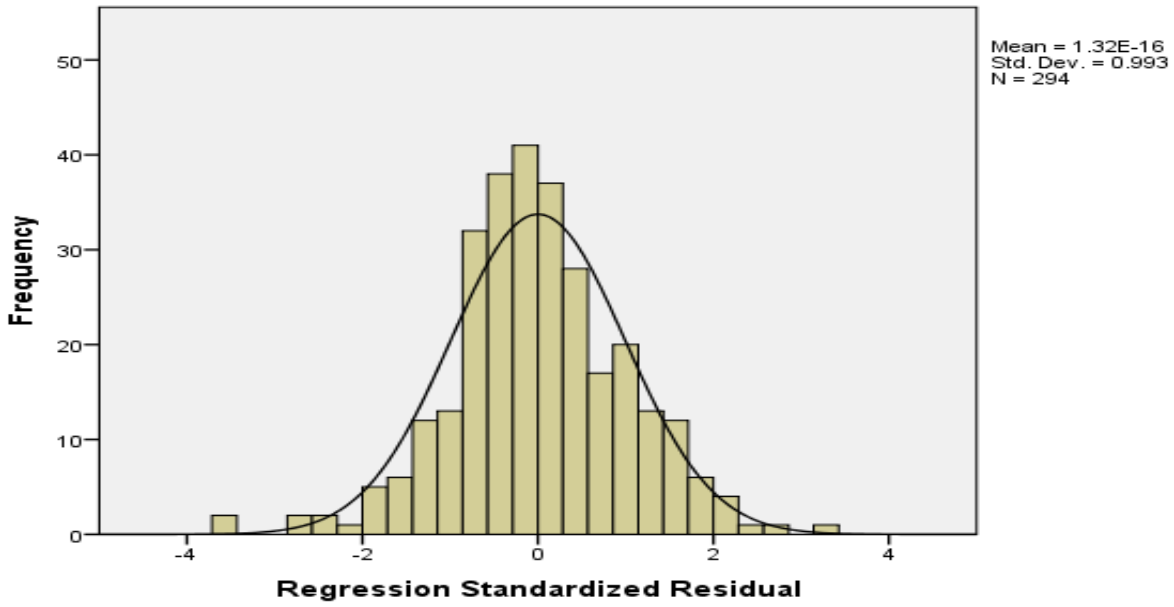

Figure 4.2: Regression Standardized Residual According to the Variable Number of Years of Experience in the Field of Occupational Safety and Health

The previous figure 4.2 show the moderation of the distribution and collect data about the straight line. Therefore, the residues follow the normal distribution, which is one of the conditions for the validity of the regression analysis.

Table 4.29: The Results of the ANOVA Test According to the Variable the Size of the Projects that have been Implemented Through Organization During the Past Five Years

R	0.670
R Square	0.448
F Value	46.819
F Significant	0.000

The table 4.29 shows the results of the ANOVA analysis of variance, and from it we conclude that there are statistically significant differences between groups depending on a variable the size of the projects that have been implemented through organization during the past five years, where the value of F is (46.819) With an indication (0.000) it is a statistically significant level of significance (0.005), and the table shows R^2 is (0.448), this means independent variable Explanation of 44.8% in the dependent variable, that means there is an effect of the independent variable on the dependent variable.

Table 4. 30: The Results of the Multiple Linear Regression test According to the Variable the Size of the Projects that have been implemented Through Organization During the Past Five Years

Model	t	Sig.	Collinearity Statistics	
			Tolerance	VIF
Technical conditions for occupational safety and health.	9.864	.000	0.731	1.368
Financial conditions for occupational safety and health.	9.909	.000	0.746	1.341
Regulation in the field of occupational safety and health.	4.022	.000	0.670	1.493
General requirements for occupational safety and health.	3.639	.000	0.705	1.418

The table 4.30 shows the results of the Multiple Linear Regression analysis, and from it we conclude that there are the collinearity statistics (VIF) for all variables are less than 3 and its between (1.341-1.493), and the tolerance between (0.670 - 0.746), so we indicate that's there is no high correlation between the factors of independent variable and nonexistent of multiple collinearity problem.

The following figure 4.3 shows the values are clustered around the mean, and this is an indication that it follows normality and this it is clear that residual follows the normal distribution.

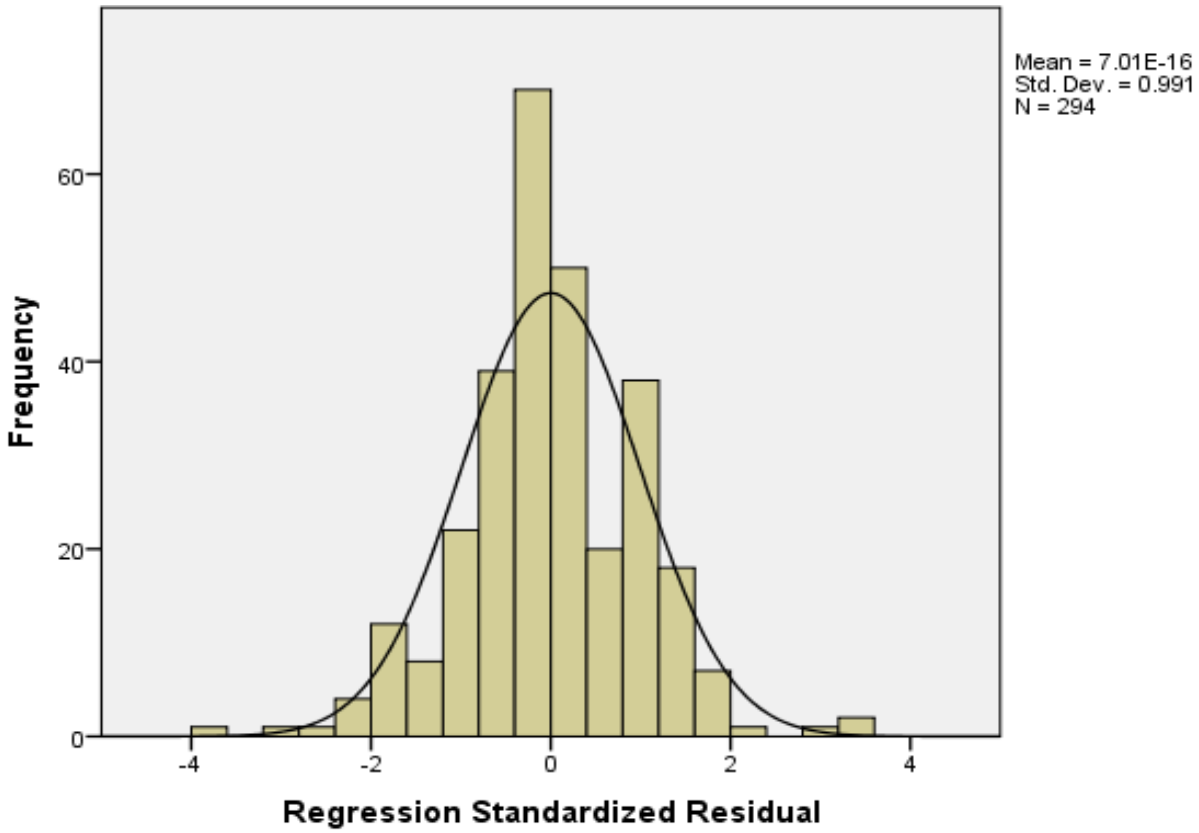

Figure 4.3: Regression standardized Residual According to the Variable the Size of the Projects that have been Implemented Through Organization During the Past Five Years

The previous figure 4.3 show the moderation of the distribution and collect data about the straight line. Therefore, the residues follow the normal distribution, which is one of the conditions for the validity of the regression analysis.

Table 4.31: The Results of the ANOVA Test According to the Variable the Educational Level

R	.539
R Square	0.291
F Value	23.636
F Significant	.000

The table 4.31 shows the results of the ANOVA analysis of variance, and from it we conclude that there are statistically significant differences between groups depending on a variable the educational level, where the

value of F is (23.636) With an indication (0.000) it is a statistically significant level of significance (0.005), and the table shows R^2 is (0.291), this means independent variable Explanation of 29.1% in the dependent variable, that means there is an effect of the independent variable on the dependent variable.

Table 4.32: The Results of the Multiple Linear Regression Test According to the Variable the Educational Level

Model	t	Sig.	Collinearity Statistics	
			Tolerance	VIF
Technical conditions for occupational safety and health.	5.593	.000	0.731	1.368
Financial conditions for occupational safety and health.	-5.515	.000	0.746	1.341
Regulation in the field of occupational safety and health.	3.586	.000	0.670	1.493
General requirements for occupational safety and health.	5.960	.000	0.705	1.418

The table 4.32 shows the results of the Multiple Linear Regression analysis, and from it we conclude that there are the collinearity statistics (VIF) for all variables are less than 3 and its between (1.341-1.493), and the tolerance between (0.670 - 0.746), so we indicate that's there is no high correlation between the factors of independent variable and nonexistent of multiple collinearity problem.

The following figure 4.4 shows the values are clustered around the mean, and this is an indication that it follows normality and this it is clear that residual follows the normal distribution.

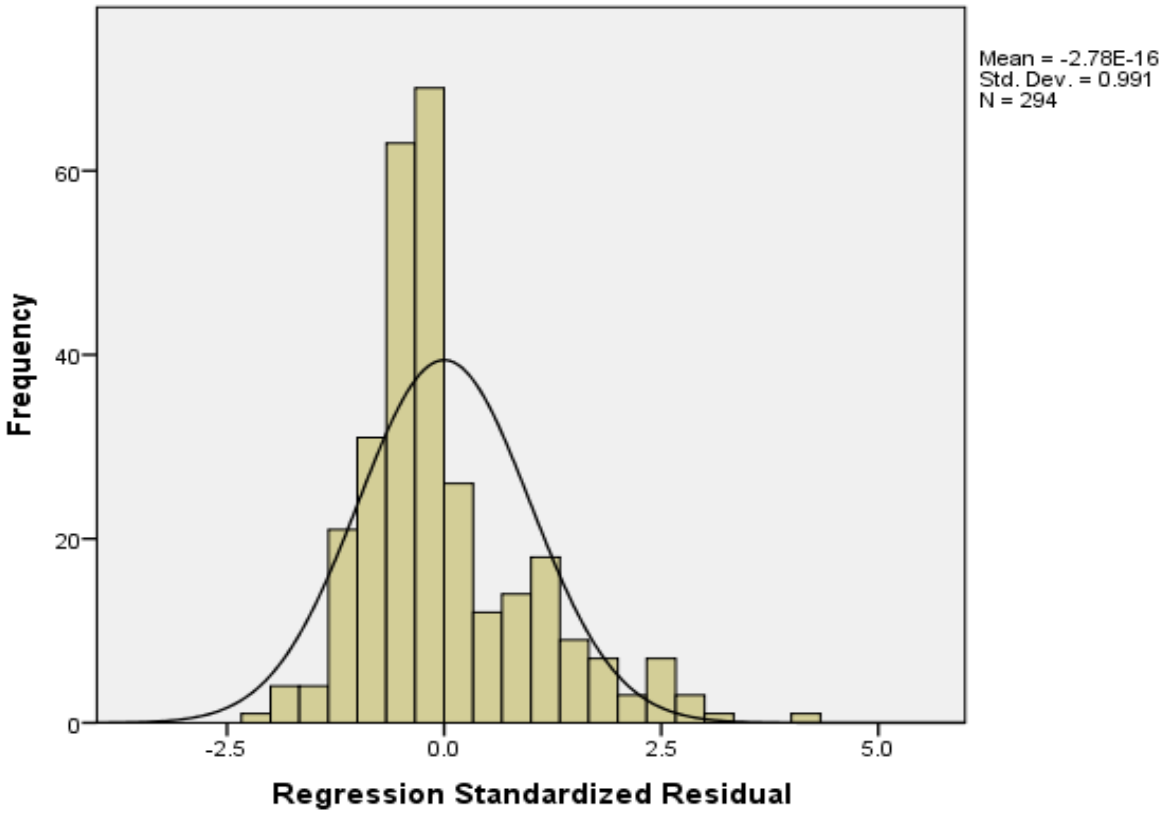

Figure 4.4: Regression Standardized Residual According to the Variable the Educational Level

The previous figures 4.4 show the moderation of the distribution and collect data about the straight line. Therefore, the residues follow the normal distribution, which is one of the conditions for the validity of the regression analysis.

4.9 Comparison Between the Results of Criteria Founded in this Research and the Results from Literature Review.

The researcher conduct comparison between criteria founded from this research and criteria founded from literature review, and finding 11 criteria, there were 11 common and similar criteria between the previous studies and this study.

The following table 4.32 shows the similar criteria between the previous studies and this study.

Table 4.33: The Similar Criteria Between the Previous Studies and this Study

NO.	Criteria Founded from this Research	RII for this Research	Criteria Founded from Literature Review	Author for Criteria Founded from Literature Review
1	Quality of equipment and tools owned by the engineering office.	0.8537	Equipment	(Kamar, et al., 2014), (Nieto-Morote & Ruz-Vila ,2012), (El-Sawalhi, et al., 2007).
2	Bank facilities obtained by the engineering office.	0.8497	Bank arrangement	(El-Sawalhi, et al., 2007), (Banaitiene & Banaitis, 2006).
3	Experience of the Engineering Office in implementing projects in the field of occupational safety and health.	0.8469	Experience in the region	(Tarawneh, 2004), (Tarawneh, 2014), (Ayettey & Danso , 2018), (Nieto-Morote & Ruz-Vila ,2012), (El-Sawalhi, et al., 2007), (Banaitiene & Banaitis, 2006).
4	The capital of the engineering office.	0.8442	The capital of the company	(Tarawneh, 2014),(Stević , 2017), (Lesniak , 2015),(Nieto-Morote & Ruz-Vila ,2012), (El-Sawalhi, et al., 2007).
5	Establishing records of the type of work-related injuries.	0.8388	Injury and illness	(Ayettey & Danso , 2018), (Kamar, et al., 2014), (El-Sawalhi, et al., 2007).
6	Practical experience in the field of occupational safety and health of not less than 3 years for an engineer office class (b) or an engineering company category an engineering office.	0.8204	Experience of staff	(Mohamed & Majeed, 2016), (Lesniak , 2015), (Kamar, et al., 2014), (Nieto-Morote & Ruz-Vila ,2012), (El-Sawalhi, et al., 2007), (Banaitiene & Banaitis, 2006).
7	The size of projects implemented by the engineering office in the field of occupational safety and health.	0.8347	Size of project	(Lesniak , 2015), (Nieto-Morote & Ruz-Vila ,2012), (El-Sawalhi, et al., 2007), (Banaitiene & Banaitis, 2006).
8	The number of projects implemented by the engineering office in the field of occupational safety and health.	0.8299	Number of projects	(Lesniak , 2015), (Nieto-Morote & Ruz-Vila ,2012), (Banaitiene & Banaitis, 2006).
9	Type of current projects implemented by the engineering office.	0.7986	Type of project	(Lesniak , 2015), (Nieto-Morote & Ruz-Vila ,2012), (El-Sawalhi, et al., 2007), (Banaitiene & Banaitis, 2006).
10	The existence of an organizational structure that defines the role of workers and those responsible for occupational safety and health in the engineering office.	0.8463	Company organization	(Kamar, et al., 2014), (Nieto-Morote & Ruz-Vila ,2012), (El-Sawalhi, et al., 2007).
11	Create records of failure of the engineering office to implement projects.	0.8204	Record of failure	(El-Sawalhi, et al., 2007), (Banaitiene & Banaitis, 2006).

The previous table 4.33 shows the similar criteria between the previous studies and this study for the pre-qualification and classification in the field of occupational safety and health.

It is evident from the table, that RII was approved for the current study, and the names of the researchers who mentioned and approved these criteria in their research have been approved.

It appears that there are 11 common criteria, and according to the RII, the most important criteria are, respectively: quality of equipment and tools owned by the engineering office, bank facilities obtained by the engineering office, experience of the engineering office in implementing projects in the field of occupational safety and health, the existence of an organizational structure that defines the role of workers and those responsible for occupational safety and health in the engineering office, the capital of the engineering office, establishing records of the type of work-related injuries, the size of projects implemented by the engineering office in the field of occupational safety and health, the number of projects implemented by the engineering office in the field of occupational safety and health, create records of failure of the engineering office to implement projects, type of current projects implemented by the engineering office.

4.10 Proposed Questionnaire or Model for Health and Safety Occupational Pre-Qualification and Classification in Engineering Offices.

The researcher suggests using proposed health and safety occupational pre-qualification and classification in engineering offices questionnaire, according to previous results, results for this research.
the following tables (4.34,4.35,4.36,4.37,4.38,4.39,4.40,4.41) shows the proposed questions for health and safety occupational pre-qualification and classification in engineering offices questionnaire, see Appendix 6.

Table 4.34: The Proposed Questionnaire/ Information about the Engineering Office

Information about the Engineering Office
The Name of the Engineering Office
Address
E-mail
General Director
Authorized Signatory for the Office
Date of Establishment
Classification of the Office in Jordanian Engineers association
Registration Number in the Jordanian Engineers association
Office Area

Table 4.35: The Proposed Yes/No Questions for Health and Safety Occupational Pre-Qualification and Classification in Engineering Offices Questionnaire. ** (Circle the Applicable Answer)

NO.	Question	Answer	
1	Do you have a written health and safety occupational program?	Yes	No
2	Do you have a full time health and safety occupational director?	Yes	No
3	Do you require employees to have 30-hour training in health and safety occupational?	Yes	No
4	Do you have a safety training program for the foreman?	Yes	No
5	Does your company have an equipment registered?	Yes	No
6	Do you have corporate safety goals and objectives?	Yes	No
7	Do your company have insurance ?	Yes	No
8	Does your company have some qualified employees in health and safety occupational?	Yes	No
9	Has OSHA cited you in the past five years?	Yes	No
10	Is there financial liquidity for the engineering office?	Yes	No
11	Are there banking facilities?	Yes	No

Table 4.36: The Proposed Questionnaire/ The Areas in Which the Office is Currently Qualified

The areas in which the office is currently qualified	Category

Table 4.37: The Proposed Questionnaire/ Areas for Pre-Qualification

Areas for Pre-Qualification	Category

Table 4.38: The Proposed Questionnaire/ The Functions of the Office and the Heads of Specialization According to Registration in the Engineers Association

The Functions of the Office and the Heads of Specialization According to Registration in the Engineers Association			
Jurisdiction	Date of Registration in the Engineers Association	Name of the Former Head of Specialty	The Name of the Current Head of Jurisdiction

Table 4.39: The Proposed Questionnaire/ Technical Personnel Working in the Office According to Registration in the Engineers Association

Technical Personnel Working in the Office According to Registration in the Engineers Association					
Jurisdiction	The name	University and Graduation Year	Date of Joining the Office	Work Nature	Experience in the Same Field

Table 4.40: The Proposed Questionnaire/ Equipment and Devices Available in the Office

Equipment and Devices Available in the Office		
The Device	The Number	Device Specifications

Table 4.41: The Proposed Questionnaire/ Office Expertise in the Field of Occupational Safety and Health

Office Expertise in the Field of Occupational Safety and Health					
Project Name	Brief Description	Bid Value	Duration of the Bid	The Date of Commencement	Completion Date

4.11 Theoretical Framework of Pre-Qualification and Classification Process in the Field of Health and Safety Occupational for Engineering Offices.

The researcher suggests this theoretical framework of pre-qualification and classification process in the field of safety health and safety occupational for engineering offices. Based on the previous results, and according to instructions for classification of technical service providers for engineering and consulting offices 2020, a theoretical

framework was proposed and worked out to serve the pre-qualification and classification process in the field of health and safety occupational for companies and offices submitted for pre-qualification and classification.
The suggestion theoretical framework of pre-qualification and classification process in the field of safety health and safety occupational for engineering offices as follow, see Appendix 7:

Classification is made in the field of occupational safety and health according to two categories: a consultant engineering office or engineer's office class(A), and an engineering office or an engineer's office class (B).

4.11.1 Requirements

1. Submit CVs for the technical staff required for pre-qualification and classification in the field of occupational safety and health.
2. Providing professional certificates to technical personnel in the field of occupational safety and health.
3. Providing the expertise of the technical personnel in the field of occupational safety and health.
4. Submit the company's latest balance sheet, and provide bank solvency.
5. Submit insurance documents.
6. Submit a list of the equipment owned by the company.
7. Submit statements in records of the types of accidents related to work.
9. Submit a list of the names of the specialty heads and their specializations.
10. A list of the number of projects that have been implemented in the last 5 years in the field of occupational safety and health, if any.

4.11.2 Conditions to be Met:

1. That the service provider has a specialist head in the field of occupational safety and health with at least 7 years of experience, of which 5 years are in occupational safety and health for the consultant category or the engineer's office class (A).
2. An additional engineer in the field of occupational safety and health with at least 3 years of experience, or a university graduate with an accredited certificate in the field of occupational safety and health for the consultant category or the engineer's office, class (A).
3. The service provider has a specialist head in the field of occupational safety and health with at least 5 years of experience, of which 3 years are in occupational safety and health for an engineering office category or a class (B) engineer office.
4. An additional engineer in the field of occupational safety and health with no less than one-year experience, or a university graduate who holds an accredited certificate in the field of occupational safety and health for an engineering office category or an engineer office class (B).

5. The technical service provider should train the technical and development staff in the field of occupational safety and health periodically.
6. To have a documented system and clear and documented objectives for occupational safety and health within the company or engineering office.

The following table 4.42 shows the distribution of assessment marks for the pre-qualification of engineering offices and consulting companies in the field of occupational safety and health.

Table 4.42: Table of Basis for the Distribution of Assessment Marks for the Pre-Qualification of Engineering Offices and Consulting Companies in the Field of Occupational Safety and Health

Conditions Technical Requirements in the Field of Occupational Safety and Health	Marks
Academic qualification in the field of occupational safety and health for supervisors.	5
Certified professional certificate in the field of occupational safety and health for project managers, team leaders and officials within the engineering office.	5
A training course of not less than 30 hours in the field of occupational safety and health.	5
Head of specialization (an engineer licensed to practice the profession of occupational safety and health and assigned with the tasks of supervising it).	5
Practical experience in the field of occupational safety and health of not less than 3 years for an engineer office class (b) or an engineering company category an engineering office.	3
Practical experience in the field of occupational safety and health of not less than 5 years for a class (A) engineer office or a class 3 engineering company.	2
Membership in unions (for engineers and project managers).	5
Sub - Total Marks	**30**
Financial Requirements in the Field of Occupational Safety and Health	
The financial liquidity of the engineering office.	3
The annual financial volume of the engineering office.	3
The capital of the engineering office.	3
Bank facilities obtained by the engineering office.	3
Sub - Total Marks	**12**
Regulation in the Field of Occupational Safety and Health	
Documentation of the objectives of occupational safety and health in the engineering office.	5
The existence of an organizational structure that defines the role of workers and those responsible for occupational safety and health in the engineering office.	5
Providing a list of the major risks related to occupational safety and health arising from the activities of the engineering office.	5

Conditions	
Technical Requirements in the Field of Occupational Safety and Health	**Marks**
Create records for the type of accidents related to work.	3
Establishing records of the type of work-related injuries.	3
Create records of work-related fatal accidents.	3
Establishing engineering office success records in implementing projects.	3
Create records of failure of the engineering office to implement projects.	3
The ability to supervise and monitor.	5
Work to spread preventive culture and awareness of the importance of occupational safety and health.	5
Sub - Total Marks	**40**
The number of projects implemented by the engineering office in the field of occupational safety and health.	3
Experience of the Engineering Office in implementing projects in the field of occupational safety and health.	5
The number of equipment and tools owned by the engineering office.	5
Quality of equipment and tools owned by the engineering office.	5
Sub - Total Marks	**18**
Total Marks	**100**

Note** The applicant must secure at least 50% score in each category to be qualified.

4.12 Conclusions

This section will review the results of the study; and can be summarized in the following points:

1. The results of materiality concluded that all the criteria are important, and after giving them a ranking according to the department and according to all the criteria, that there are 3 common criteria took the most important criteria, namely: academic qualification in the field of occupational safety and health for supervisors, professional certificate in the field of occupational safety and health for project managers, team leaders within the engineering office and A training course of not less than 30 hours in the field of occupational safety and health.
2. The factor analysis was used as a reliability tool, and the analysis showed that the quality is high relative to KMO which is 0.86, and that the reliability of the questionnaire is high, as the results showed that the categories is appropriate.
3. The objective of the research was achieved, whereby the criteria for pre-qualification and classification in the field of occupational safety and health were determined through the relative importance index and by weighted mean.

4. It's suggest model for a questionnaire was reached for selecting the engineering offices and consultant companies to qualified in occupational safety and health.
5. It's suggest theoretical framework was developed for the pre-qualification and classification process for engineering offices and consultant companies in the field of occupational safety and health.
6. It's found that there is a positive relationship between the experience of engineering offices in the field of occupational safety and health and the evaluation and determination of classification standard and pre-qualification in the field of occupational safety and health.
7. It's found that there is a positive relationship between the scientific qualification of workers in the field of occupational safety and health and the evaluation and determination of classification standards and pre-qualification in the field of occupational safety and health.
8. It's found that there is a positive relationship between the size of the projects implemented in the field of occupational safety and health and the contribution to the evaluation and determination of classification standards and pre-classification in the field of occupational safety and health.

4.13 Recommendations

This section will review The recommendations that the researcher sees are important and can be summarized as follow:

1. It's recommends applying the model that was developed for the questionnaire for qualify the engineering offices and consultant companies in field occupational safety and health, by the authorities concerned with pre-qualification and classification.
2. It's recommends applying the theoretical framework for qualify the engineering offices and consultant companies in field occupational safety and health, by the authorities concerned with pre-qualification and classification.
3. It's recommends using the criteria extracted in the form prepared in this study as a basis for the selection process for engineering offices in the field of occupational safety and health, given that it takes into account the most important selection factors necessary.
4. This model can be relied upon in the future in the selection and qualification process by the Ministry of Public Works and by the Jordanian Engineers Association, and for generalization to the various authorized sides, so that the selection methods are standardized locally, to obtain the best results.
5. It's recommends that there be specialized programs in occupational safety and health in all engineering offices, whether qualified or not, due to the importance of this field in all aspects and stages of work.

6. It's recommends intensifying periodic monitoring of engineering offices regarding this field, because it is marginalized and not a priority for it, although it is one of the most important factors that must be available in any engineering office.
7. It's recommends adopting a system of adding points for pre-qualification when submitting bids to these companies and consulting offices, so that the priority for offices committed to occupational safety and health.
8. It's recommends cooperation and follow-up with the civil defence in order to train prevention measures and train workers on occupational safety and health.
9. It is recommended that it be mandatory to find an occupational health and safety engineer on site.
10. It's recommends that there be high penalties if safety rules are violated.
11. Establishing incentives and privileges for companies and engineering offices to motivate them to provide high performance in the field of occupational safety and health.
12. An annual event by the Engineers Association to distribute awards to the most committed companies to occupational safety and health, in order to stimulate companies and engineering offices to develop themselves.

4.14 Future Works

1. It's recommends studying the possibility of using other methods in the pre-qualification and classification process to obtain better results.
2. It's recommends conducting more studies and research related to the pre-qualification and classification of engineering companies in the field of occupational safety and health.

4.15 Limitations of Study

The researcher was not able to distribute the questionnaire in hard copy for the sample, as it was distributed as a soft copy, due to the current conditions in the world, which is the Corona pandemic.

For the same reason as COVID-19, most of the interviews were not conducted personally, as the interviews were conducted by phone.

The study will be limited to the engineering offices and consulting companies in Jordan, according to the Jordanian Engineers Association classification, and the study will not include ministries and government institutions.

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APPENDIX I

(Names of the arbitrators)

Arbitrator	Position
Prof. Ibraheem Alhadethe	Professor of engineering management at the Mu'tah University and Al-Isra University
Prof. Mohammed Abu Saleh	Professor of Statistics at Yarmouk University and Amman Arab University
Dr. Salah Al-Jboor	Doctor in the Department of Engineering Management at Mutah University
Mr. Samer Awadalla	General Manager of SAC Company for Surveying and Quantity Survey
Dr. Loai Abu Qatosseh	Head of the Occupational Safety and Health Committee at the Petra University

APPENDIX II

(Names of those who were interviewed)

Name	Position	Type of interview
Mr. Samer Awadalla	General Manager of SAC Company for Surveying and Quantity Survey	Personal interview
Dr. Loai Abu Qatosseh	Head of the Occupational Safety and Health Committee at the Petra University	Telephone interview
Eng. Raed Halaseh	General Manager of the Five Arches Consulting and Training Company	Telephone interview
Eng. Adnan Alswaeer	General Director of the Italian Center for Occupational Safety and Health	Telephone interview
Eng. Mohammed Waleed	Head of the Support Services Department in the Department of Lands and Survey	Telephone interview
Dr. Mysoon Remawi	Certified trainer at the Italian Center for Occupational Safety and Health	Telephone interview
Dr. Yousef Aleker	Certified trainer at the Italian Center for Occupational Safety and Health	Telephone interview
Eng. Manar Ajlouni	Lecture at Al-Hussein College for Occupational Safety and Health	Telephone interview
Eng. Pilaje Alquraan	Certified Trainer in Occupational Safety and Health / Master of Occupational Safety and Health	Telephone interview

APPENDIX III

Questionnaire (In Arabic)

استبانة

تقييم معايير التأهيل والتصنيف للمكاتب الهندسية في مجال السلامة والصحة المهنية

أخي / أختي المحترم/ة

تحية طيبة وبعد ،،،،

الهدف من هذه الاستبانة هو تحديد أهم معايير التاهيل والتصنيف للمكاتب الهندسية في مجال السلامة والصحة المهنية، وتأتي هذه الاستبانة كخطوة أولى في عملية اتخاذ قرار واختيار أفضل هذه المكاتب. ومن هنا تبرز أهمية هذه الاستبانة الذي سيحدد العوامل المؤثرة في عملية التأهيل المسبق للمكاتب الهندسية وذلك من خلال الاخذ باراء أصحاب الاختصاص والخبرة في الجهات المالكة (حكومية وغير حكومية) ومكاتب هندسية واستشارية بغرض تحديد معايير للاختيار في القطاع الهندسي، وذلك بما يتناسب مع واقعنا المحلي.
ولتحقيق هذا الهدف يرجى التكرم بتعبئة هذه الاستبانة بتروي وبعناية قدر الإمكان وذلك للتعرف على كافة الآراء ووجهات النظر المتعلقة بهذا الموضوع الهام ، مع ملاحظة أن جميع المعلومات في هذه الاستبانة سوف تستخدم في اغراض البحث العلمي فقط، كجزء لاستكمال متطلبات الدراسة لنيل درجة الماجستير في الادارة الهندسية من كلية الهندسة في جامعة مؤتة.
ونتقدم لكم بوافر الشكر على مشاركتكم في إثراء هذا البحث الذي يشكل جزءا من رسالة الماجستير.

وتفضلوا بقبول فائق الاحترام والتقدير،،،

الباحثة : منار محمود عبد الرحمن
إشراف :أ. د. سلطان الطراونة

الجزء الأول

المتغيرات الديمغرافية

❖ **يرجى وضع علامة " √ " في المكان المناسب**

1	**الجنس**	
	ذكر	**انثى**

2	**المستوى التعليمي**			
	دبلوم	**بكالوريوس**	**ماجستير**	**دكتوراه**

3	**حدد حجم المشاريع التي نفذت عبر مؤسستكم خلال الخمس سنوات الماضية (دينار)؟**			
	اقل من 10 الاف	**اكثر من 10 الاف - اقل من 100 الف**	**اكثر من 100 الف – اقل من 1 مليون**	**اكثر من 1 مليون**

4	ما هو الوصف الأنسب لطبيعة عملك في المؤسسة التي تعمل فيها؟			
	مدير مشروع	مهندس مشرف	استشاري	جهة اخرى

5	عدد سنوات خبرتك العملية؟			
	اقل من سنة	اكثر من سنة - اقل من 3 سنوات	اكثر من 3 سنوات – اقل من 10 سنوات	اكثر من 10 سنوات

6	عدد سنوات الخبرة في مجال السلامة العامة والصحة المهنية ؟			
	اقل من سنة	اكثر من سنة - اقل من 3 سنوات	اكثر من 3 سنوات – اقل من 10 سنوات	اكثر من 10 سنوات

7	عدد سنوات خبرة المكتب الذي تعمل به حاليا ؟			
	اقل من سنة	اكثر من سنة - اقل من 3 سنوات	اكثر من 3 سنوات – اقل من 10 سنوات	اكثر من 10 سنوات

الجزء الثاني

تحديد العوامل التي تؤثر في عملية التصنيف والتأهيل المسبق في مجال السلامة والصحة المهنية

- **الرجاء تحديد أهمية العوامل التي تؤثر في عملية اختيار وتاهيل وتصنيف المكاتب الهندسية في مجال السلامة والصحة المهنية بوضع إشارة " √ " في الخانة التي تعبر عن مدى الأهمية.**

الشروط الفنية للسلامة والصحة المهني						
	العامل المؤثر	مهم جدا	مهم	متوسط الاهمية	قليل الاهمية	عديم الاهمية
1	المؤهل الاكاديمي في مجال السلامة والصحة المهنية للمشرفين					
2	شهادة مهنية معتمدة في مجال السلامة والصحة المهنية لمديري المشاريع ولقائدي الفريق والمسؤولين داخل المكتب الهندسي					
3	دورة تدريبية لا تقل عن 30 ساعة في مجال السلامة والصحة المهنية للعاملين في المكتب الهندسي					
4	رئيس اختصاص (مهندس مرخص له مزاولة مهنة السلامة والصحة المهنية ومكلف بمهام الاشراف عليها)					
5	خبرة عملية في مجال السلامة والصحة المهنية لا تقل عن 3 سنوات ل مكتب مهندس فئة (ب) او شركة هندسية فئة مكتب هندسي					
6	خبرة عملية في مجال السلامة والصحة المهنية لا تقل عن 5 سنوات ل مكتب مهندس فئة (أ) او شركة هندسية فئة استشاري					
7	قلة البرامج التدريبية على مواضيع السلامة والصحة المهنية					

الشروط المالية للسلامة والصحة المهني						
	العامل المؤثر	مهم جدا	مهم	متوسط الاهمية	قليل الاهمية	عديم الاهمية
8	السيولة المالية للمكتب الهندسي					
9	الحجم المالي السنوي للمكتب الهندسي					
10	رأس مال المكتب الهندسي					
11	حجم ديون المكتب الهندسي					
12	التسهيلات البنكية التي يحصل عليها المكتب الهندسي					
13	وجود عوائق اثناء الحصول على الخدمات البنكية					

التنظيم في مجال السلامة والصحة المهني						
	العامل المؤثر	مهم جدا	مهم	متوسط الاهمية	قليل الاهمية	عديم الاهمية
14	توثيق الاهداف الخاصة بالسلامة والصحة المهنية في المكتب الهندسي					
15	وجود هيكل تنظيمي يحدد دور العامليين والمسؤوليين عن السلامة والصحة المهنية في المكتب الهندسي					
16	توفير قائمة بالمخاطر الكبيرة المتعلقة بالسلامة والصحة المهنية الناشئة عن انشطة المكتب الهندسي					
17	انشاء سجلات خاصة بنوع الحوادث المرتبطة بالعمل					
18	انشاء سجلات بنوع الاصابات المرتبطة بالعمل					
19	انشاء سجلات للحوادث المميتة المرتبطة بالعمل					
20	انشاء سجلات نجاح المكتب الهندسي في تنفيذ المشاريع					
21	انشاء سجلات فشل المكتب الهندسي في تنفيذ المشاريع					
22	القدرة على الاشراف والمراقبة					
23	العمل على نشر الثقافة الوقائية والتوعية بأهمية السلامة والصحة المهنية.					
24	عدم وجود اهداف خاصة بالسلامة والصحة المهنية داخل المكتب الهندسي					

متطلبات عامة للسلامة والصحة المهني						
	العامل المؤثر	مهم جدا	مهم	متوسط الاهمية	قليل الاهمية	عديم الاهمية
25	قائمة بالخدمات التي يقدمها المكتب الهندسي					
26	حجم المشاريع التي نفذت في مجال السلامة والصحة المهنية					
27	عدد المشاريع التي نفذت في مجال السلامة والصحة المهنية					
28	سنوات خبرة الشركة في تنفيذ مشاريع في مجال السلامة والصحة المهنية					
29	العضوية في النقابات (للمهندسين ومديري المشاريع)					
30	عدم توفير قوائم بالخدمات التي يقدمها المكتب الهندسي					
31	عدد المشاريع التي تنفذها الشركة حاليا					
32	نوعية المشاريع الحالية التي تنفذها الشركة					
33	عدد المعدات والادوات التي يمتلكها المكتب الهندسي					
34	نوعية المعدات والادوات التي يمتلكها المكتب الهندسي					

APPENDIX IV

Questionnaire (In English)

Part One

General Information

❖ Please tick " √ " in the Appropriate Place

1	**Gender**	
	Male	**Female**

2	**Degree of academic qualification**			
	BSc	**M.A**	**PhD**	**Another**

3	**Determine the size of the projects that have been implemented across your organization during the past five years? (in JD)**			
	Less 10 thousand	**More 10 thousand – less 100 thousand**	**More 100 thousand – less 1 million**	**More 1 M**

4	**What is the most appropriate description of the nature of your work in the organization in which you work?**			
	Project manager	**Client agent**	**Project director**	**Another**

5	**How many years of work experience have you had in engineering field?**			
	Less 1 year	**More 1 year – less 3 years**	**More 3 years – less 10 years**	**More 10 years**
6	**How many years of experience in public safety and occupational health?**			
	Less 1 year	**More 1 year – less 3 years**	**More 3 years – less 10 years**	**More 10 years**

7	**The number of years of experience in the office you work in?**			
	Less 1 year	**More 1 year – less 3 years**	**More 3 years – less 10 years**	**More 10 years**

Part two

Determine the factors that affect the classification and pre-qualification process in the field of occupational safety and health

Please specify the importance of the factors that affect the selection, pre-qualification and classification of engineering offices in the field of occupational safety and health by putting a "√" in the box that expresses the extent of importance.

Technical conditions for occupational safety and health						
The influencing factor		**Very important**	**Important**	**Natural**	**Of little importance**	**Not important**
1	Academic qualification in the field of occupational safety and health for supervisors					
2	Certified professional certificate in the field of occupational safety and health for project managers, team leaders and officials within the engineering office					
3	A training course of not less than 30 hours in the field of occupational safety and health					
4	Head of specialization (an engineer licensed to practice the profession of occupational safety and health and assigned with the tasks of supervising it)					
5	Practical experience in the field of occupational safety and health of not less than 3 years for an engineer office class (b) or an engineering company category an engineering office					
6	Practical experience in the field of occupational safety and health of not less than 5 years for a class (A) engineer office or a class 3 engineering company					
7	Lack of training programs on occupational safety and health topics					

Financial conditions for occupational safety and health						
The influencing factor		**Very important**	**Important**	**Natural**	**Of little importance**	**Not important**
8	The financial liquidity of the engineering office					
9	The annual financial volume of the engineering office					
10	The capital of the engineering office					
11	The size of the debts of the engineering office					
12	Bank facilities obtained by the engineering office					
13	Obstacles while obtaining banking services					

Regulation in the field of occupational safety and health						
The influencing factor		**Very important**	**Important**	**Natural**	**Of little importance**	**Not important**
14	Documentation of the objectives of occupational safety and health in the engineering office					
15	The existence of an organizational structure that defines the role of workers and those responsible for occupational safety and health in the engineering office					
16	Providing a list of the major risks related to occupational safety and health arising from the activities of the engineering office					
17	Create records for the type of accidents related to work					
18	Establishing records of the type of work-related injuries					
19	Create records of work-related fatal accidents					
20	Establishing engineering office success records in implementing projects					
21	Create records of failure of the engineering office to implement projects					
22	The ability to supervise and monitor					
23	Work to spread preventive culture and awareness of the importance of occupational safety and health					
24	It is not important to document occupational safety and health objectives within the engineering office					

General requirements for occupational safety and health						
The influencing factor		**Very important**	**Important**	**Natural**	**Of little importance**	**Not important**
25	Services provided by the engineering office					
26	The size of projects implemented by the engineering office in the field of occupational safety and health					
27	The number of projects implemented by the engineering office in the field of occupational safety and health					
28	Experience of the Engineering Office in implementing projects in the field of occupational safety and health					
29	Membership in unions (for engineers and project managers)					
30	Failure to provide lists of services provided by the engineering office					
31	The number of projects currently implemented by the engineering office					
32	Type of current projects implemented by the engineering office					
33	The number of equipment and tools owned by the engineering office					
34	Quality of equipment and tools owned by the engineering office					

APPENDIX V

(Monthly work report for engineering and consulting offices)

نقابة المهندسين الأردنيين
Jordan Engineers Association

المكاتب الهندسية والمهندسون العاملون فيها

- تم تسجيل(11)مكتب هندسي, وتم اعادة تسجيل(2)مكتب هندسي خلال شهر(شباط)لعام(2020)
- تم تجميد (1) مكتب هندسي خلال شهر (شباط) لعام (2020)
- أصبح عدد المكاتب الهندسية العاملة لنهاية شهر (شباط) لعام (2020) (1242) مكتبا وشركة هندسية موزعة كما يلي :
  - (775) مكتب مهندس
    (419) مرتبة أ , (356) مرتبة ب
  - (246) مكتب هندسي
  - (213) مكتب استشاري
  - (8) مكتب رأي

- تم تسجيل (191) مهندساً خلال شهر (شباط) لعام (2020) منهم (51) في التصميم ، و (137) مهندسا في الإشراف , و (3) في برامج التدريب
- تم الغاء تسجيل (200) مهندسا خلال شهر (شباط) لعام (2020) منهم (64) في التصميم , و (129) مهندساً في الاشراف ، و (7) في برامج التدريب
- اصبح عدد المهندسين العاملين في المكاتب لغاية نهاية شهر (شباط) من عام (2020) (7960) مهندسا كما يلي :
  - (2977) مهندسا مسجلا في الإشراف
  - (4623) مهندسا مسجلا في التصميم
  - (360) مهندسا مسجلا في التدريب

- عقد مجلس الهيئة (٤) اجتماعات رفع خلالها (١٩٥) توصية

APPENDIX VI

(proposed questionnaire for health and safety occupational pre-qualification and classification in engineering offices)

NO.	Question	Answer	
1	Do you have a written health and safety occupational program?	Yes	No
2	Do you have a full time health and safety occupational director?	Yes	No
3	Do you require employees to have 30-hour training in health and safety occupational?	Yes	No
4	Do you have a safety training program for the foreman?	Yes	No
5	Does your company have an equipment registered?	Yes	No
6	Do you have corporate safety goals and objectives?	Yes	No
7	Do your company have insurance ?	Yes	No
8	Does your company have some qualified employees in health and safety occupational?	Yes	No
9	Has OSHA cited you in the past five years?	Yes	No
10	Is there financial liquidity for the engineering office?	Yes	No
11	Are there banking facilities?	Yes	No

Information about the engineering office	
The name of the engineering office	
Address	
E-mail	
General Director	
Authorized signatory for the office	
Date of Establishment	
Classification of the office in Jordanian Engineers association	

Registration number in the Jordanian Engineers association	
Office area	
The areas in which the office is currently qualified	Category

Areas for pre-qualification	Category

The functions of the office and the heads of specialization according to registration in the Engineers Association			
Jurisdiction	Date of registration in the Engineers Association	Name of the former head of specialty	The name of the current head of jurisdiction

Technical personnel working in the office according to registration in the Engineers Association					
Jurisdiction	The name	University and graduation year	Date of joining the office	work nature	Experience in the same field

Equipment and devices available in the office		
The device	The number	Device specifications

Office expertise in the field of occupational safety and health					
project name	Brief description	Bid value	Duration of the bid	The date of commencement	Completion date

APPENDIX VII

(Theoretical framework of pre-qualification and classification process in the field of safety health and safety occupational for engineering offices)

Classification is made in the field of occupational safety and health according to two categories: a consultant engineering office or engineer's office class(A), and an engineering office or an engineer's office class (B).

Requirements:

2. Submit CVs for the technical staff required for pre-qualification and classification in the field of occupational safety and health.

2. Providing professional certificates to technical personnel in the field of occupational safety and health.

3. Providing the expertise of the technical personnel in the field of occupational safety and health.

4. Submit the company's latest balance sheet, and provide bank solvency.

5. Submit insurance documents.

6. Submit a list of the equipment owned by the company.

7. Submit statements in records of the types of accidents related to work.

9. Submit a list of the names of the specialty heads and their specializations.

10. A list of the number of projects that have been implemented in the last 5 years in the field of occupational safety and health, if any.

Conditions to be met:

1. That the service provider has a specialist head in the field of occupational safety and health with at least 7 years of experience, of which 5 years are in occupational safety and health for the consultant category or the engineer's office class (A).

2. An additional engineer in the field of occupational safety and health with at least 3 years of experience, or a university graduate with an accredited certificate in the field of occupational safety and health for the consultant category or the engineer's office, class (A).

3. The service provider has a specialist head in the field of occupational safety and health with at least 5 years of experience, of which 3 years are in occupational safety and health for an engineering office category or a class (B) engineer office.

4. An additional engineer in the field of occupational safety and health with no less than one-year experience, or a university graduate who holds an accredited certificate in the field of occupational safety and health for an engineering office category or an engineer office class (B).

5. The technical service provider should train the technical and development staff in the field of occupational safety and health periodically.

6. To have a documented system and clear and documented objectives for occupational safety and health within the company or engineering office.

The following table 4.40 shows the distribution of assessment marks for the pre-qualification of engineering offices and consulting companies in the field of occupational safety and health.

Conditions	
Technical requirements in the field of occupational safety and health	**Marks**
Academic qualification in the field of occupational safety and health for supervisors.	5
Certified professional certificate in the field of occupational safety and health for project managers, team leaders and officials within the engineering office.	5
A training course of not less than 30 hours in the field of occupational safety and health.	5
Head of specialization (an engineer licensed to practice the profession of occupational safety and health and assigned with the tasks of supervising it).	5
Practical experience in the field of occupational safety and health of not less than 3 years for an engineer office class (b) or an engineering company category an engineering office.	3
Practical experience in the field of occupational safety and health of not less than 5 years for a class (A) engineer office or a class 3 engineering company.	2
Membership in unions (for engineers and project managers).	5
Sub - total marks	**30**
Financial requirements in the field of occupational safety and health	
The financial liquidity of the engineering office.	3
The annual financial volume of the engineering office.	3
The capital of the engineering office.	3
Bank facilities obtained by the engineering office.	3
Sub - total marks	**12**
Regulation in the field of occupational safety and health	
Documentation of the objectives of occupational safety and health in the engineering office.	5
The existence of an organizational structure that defines the role of workers and those responsible for occupational safety and health in the engineering office.	5
Providing a list of the major risks related to occupational safety and health arising from the activities of the engineering office.	5
Create records for the type of accidents related to work.	3

Conditions	
Regulation in the field of occupational safety and health	**Marks**
Establishing records of the type of work-related injuries.	3
Create records of work-related fatal accidents.	3
Establishing engineering office success records in implementing projects.	3
Create records of failure of the engineering office to implement projects.	3
The ability to supervise and monitor.	5
Work to spread preventive culture and awareness of the importance of occupational safety and health.	5
Sub - total marks	**40**
General requirements in the field of occupational safety and health	
The number of projects implemented by the engineering office in the field of occupational safety and health.	3
Experience of the Engineering Office in implementing projects in the field of occupational safety and health.	5
The number of equipment and tools owned by the engineering office.	5
Quality of equipment and tools owned by the engineering office.	5
Sub - total marks	**18**
Total marks	**100**

Note** The applicant must secure at least 50% score in each category to be qualified.

المعلومات الشخصية

الاسم: منار محمود عيسى عبدالرحمن

التخصص: الماجستير في الإدارة الهندسية

الكلية: الهندسة

سنة التخرج: 2020