Mu'tah University
College of graduate studies

Risk Analysis of the Criteria of Locating Public Buildings

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A Thesis Submitted to the College of Graduate Studies in Partial Fulfillment of the Requirements for the Degree of Master of Engineering Management/Faculty of Engineering

Mutah University, 2021

الآراء الواردة في الرسالة الجامعية لا تُعبَر
بضرورة عن وجهة نظر جامعة مؤتة

MUTAH UNIVERSITY

College of Graduate Studies

جامعة مؤتـــة

كلية الدراسات العليا

قرار إجازة رسالة جامعية

تقرر إجازة الرسالة المقدمة من الطالب عنان شاهر عبدالله الطراونه

والموسومة بـ: risk analysis in the criteria of locating public buildings

استكمالاً لمتطلبات الحصول على درجة الماجستير في الإدارة الهندسية

القسم: الإدارة الهندسية في تاريخ ٢٠٢١/٠١/١١

من الساعة ٥ إلى الساعة ٧ قرار رقم ٨٧/٢٠٢٠

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عميد كلية الدراسات العلي

أ.د عمر المعايطة

Dedication

To my mother
To my mother
To my mother
To the soul of my grandma
To my heart son Karam
To my father & my brother's (Ammar, Amer, Ahmad & Saif)
To my husband Assal

Anan Altarawneh

Acknowledgment

All grace and praise to Almighty Allah who created me and gave me the strength and courage to fulfill my ambition.

I would like to thank my supervisor, Prof. Omer Maaitah, for his support and encouragement, in helping me throughout my research project.

Anan Altarawneh

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Abbreviations

CPM	Critical Path Method
RM	Risk Management
EIA	Environmental Impact Assessment
TIA	Traffic Impact Assessment
EFA	Exploratory factor analysis
KMO	Kaiser-Mayer-Olkin
VIF	Variance inflation factor
SLR	Simple linear regression
MLR	Multiple linear regression
R	Correlation
R^2	Coefficient of determination
Beta	Regression Coefficient
RII	Relative importance index
Sig	Significant

Abstract

Risk Analysis of the Criteria of Locating Public Building

Anan Altarawneh

Mutah University, 2021

Due to the growth of Jordan population, financial difficulties, and its critical geographical location, this study aim to investigate and unveil the impact of risk analysis in the criteria for locating public buildings. To attain this objective, the study uses a descriptive and analytical approach to collect the required data, and SPSS statistical software to extract the results. For the numerical data, two tools were used to collect data through two questionnaires; the first is directed to the study population, civil engineers, and architects who are considered the main tool on which the study relied on testing the hypotheses. Whereas, the second questionnaire is directed to the local population to know their orientations concerning the potential risks in selecting public buildings location.

The results of the study confirmed the existence of a statistically significant impact of risk analysis in all dimensions (environmental risks, human risks, operational risks, financial risks) on the criteria for identifying public buildings locations in all dimensions (human resources, competitive advantage, cost), where the value of R2 was (0.597). This value indicates that risk analysis in all its dimensions affects by (59.7%) the dependent variable.

The study achieves many recommendations and procedures based on the results, such as the fact that the engineers who perform the risk analysis can define the building's locations with more accurate criteria. Also, a decision of government building location chosen must be taken with its presence of TIA and EIA. also, take into consideration these recommendations will lead to improving the criteria for identifying the location of public buildings, besides, a proposed guide for a public building location selection was created.

الملخص

تحليل مخاطر معايير تحديد موقع المباني العامة

عنان الطراونة

جامعة مؤتة، 2021

نظرًا للنمو السكاني في الأردن، والصعوبات المالية، والموقع الجغرافي الحرج، تهدف هذه الدراسة إلى التحقيق والكشف عن تأثير تحليل المخاطر في معايير تحديد مواقع المباني العامة. لتحقيق هذا الهدف استخدمت الدراسة المنهج الوصفي والتحليلي لجمع البيانات المطلوبة، والبرمجيات الإحصائية SPSS لاستخراج النتائج. بالنسبة للبيانات الرقمية، تم استخدام أداتين لجمع البيانات من خلال استبيانين؛ الأول موجه إلى مجتمع الدراسة والمهندسين المدنيين والمهندسين المعماريين الذين يعتبرون الأداة الرئيسية التي اعتمدت عليها الدراسة في اختبار الفرضيات. في حين أن الاستبيان الثاني موجه للسكان المحليين لمعرفة توجهاتهم فيما يتعلق بالمخاطر المحتملة في اختيار مواقع المباني العامة.

أكدت نتائج الدراسة وجود تأثير ذي دلالة إحصائية لتحليل المخاطر بجميع أبعادها (المخاطر البيئية، المخاطر البشرية، المخاطر التشغيلية، المخاطر المالية) على معايير تحديد مواقع المباني العامة بجميع أبعادها (الموارد البشرية، الميزة التنافسية، cost) حيث بلغت قيمة R2 (0.597). وتشير هذه القيمة إلى أن تحليل المخاطر بكافة أبعاده يؤثر بنسبة (59.7٪) على المتغير التابع.

توصلت الدراسة إلى العديد من التوصيات والإجراءات بناءً على النتائج، مثل حقيقة أن المهندسين الذين يقومون بتحليل المخاطر يمكنهم تحديد مواقع المبنى بمعايير أكثر دقة. أيضًا، يجب اتخاذ قرار بشأن موقع المبنى الحكومي المختار بحضور TIA وEIA. أيضًا، فإن الأخذ في الاعتبار أن هذه التوصيات ستؤدي إلى تحسين معايير تحديد مواقع المباني العامة، إلى جانب إنشاء دليل مقترح لاختيار موقع المباني العامة.

Chapter One
Introduction

According to global population growth statistics, the world is growing at a rate of approximately 1.05%, which means 81million people per year. This increase of numbers around the world requires more services and utilities to cover human needs for growth and ensure their right to a decent living World Population is about 7.8 Billion People (Worldometer, 2020), while the Jordan Population is about 10 million people in 2020 (Worldometer, 2020).

Public buildings can be defined as buildings that are available to the public and are sometimes funded by the government. They include governmental offices such as courts, post offices, and public and private schools, libraries, hospitals, etc., they are built to provide a service to the public (VanBaren, 2019), the following images are examples of a public building in Jordan.

To provide the services required, public buildings must be thoroughly planned for, starting with the location selection process to a futuristic view for the future development of the facility. Such planning as any other aspect of life carries many risks, so there must be a proper way to conduct risk management for public projects.

Human actions such as agricultural development, commercial afforestation of pine trees, and urbanization have resulted in environmental changes, i.e. loss of original environment reduced size of environment patch, and increasing isolation of environment areas (Nikolakaki, 2004). These processes result in heterogeneous parts of the land, which consist of fairly isolated areas of the suitable environment within a matrix of environments fit for fake or to provide food and housing for confined species in the original environment. Landscape alteration as a result of environment fragmentation has far-reaching costs for the survival of the types (Nikolakaki, 2004).

Here are some rules that's comes in the local administration law in Jordan:

The kingdom is divided into governorates, districts, and districts according to the system of administrative divisions. The governorate enjoys legal personality, financial and administrative independence, and is headed by the governor (The buildings and regulations system, cities and villages, and the amended regulations, (Regulation No. 136 of 2016).

The Ministry shall assume the following tasks and powers: -

1. Coordination of matters related to cross-governorate projects and joint projects between them.
2. Setting development plans and programs, adopting standards and indicators of development services and measuring performance.

Also, participate in locating public buildings through the text of Article 6 mentioned in (Municipalities Law No. 41 of 2015).

According to the annual traffic report in Jordan for the year 2019 traffic accidents take away the life of over that 1.35 people globally each year, and over 50 million people injured and have life-altering effects due to the accidents.

1.1 Significance of the Study

The significance of this study stems from the serious necessity of the accurate selection of public buildings sites and highlighting the factors and risks that may result from the selection process.

The study aims at creating a guideline for the site selection process for public buildings specifically the educational and health sectors. By collecting data and information from multiple resources, referring to previous studies, and conducting surveys, the result of this study will lead to a more applicable process that will assist in the urbanization process in the light of the rapid growth of the population. Furthermore, the results of the current study maybe help the authority to specify criteria of site selection, and may prevent or reduce and the risks related to the construction of the public buildings and improve the accessibility and benefits provided by such buildings, which maybe help the authority to specify criteria of site selection.

1.2 Problem Statement

Nowadays, Jordan is facing many challenges due to the growth of its population, financial difficulties, and its critical geographical location on the world map which contributes to the sudden growth of population due to a large number of refugees. Thus, there is an urgent need to reconsider the importance of urbanization as an integral part of the solution to these challenges.

All challenges mentioned above lead to the need of constructing more public and service buildings like schools and hospitals which are the main concern of the current study. Hence, the study will provide risk analysis for choosing the location for public buildings. Besides, the study concentrates on the precautionary procedures that should be taken in consideration while constructing the buildings step by step considering the fact that Jordan has no laws, rules, regulations or a guideline for this field of the countries' development.

Undoubtedly, site selection and development involve a wide range of actions with social, environmental, and economic dimensions. These dimensions can result in a wide range of effects that play a role in the long-term health and security of people and communities.

1.3 Research Questions

The study, mainly, aims to explore if there is any impact of risk analysis with its combined dimensions (environmental risks, human risks, operational risks, financial risks) in the criteria for determining public buildings with their dimensions (cost, human resources, competitive advantage).

The main question is divided into the following sub-questions:

1. Is there an impact of risk analysis in all its dimensions (environmental risks, human risks, operational risks, financial risks) on the cost?
2. Is there an impact of risk analysis in all its dimensions (environmental risks, human risks, operational risks, financial risks) on human resources?
3. Is there an impact of risk analysis in all its dimensions (environmental risks, human risks, operational risks, financial risks) on the competitive advantage?

1.4 Objectives

This research aims at fulfilling the following objectives:

1. Studying and identifying the impact of risk analysis in all its dimensions (environmental risks, human risks, operational risks, financial risks) on the cost.
2. Investigating the impact of risk analysis in all its dimensions (environmental risks, human risks, operational risks, financial risks) on human resources

3. Studying the impact of risk analysis in all its dimensions (environmental risks, human risks, operational risks, financial risks) on the competitive advantage.

1.5 Study Hypotheses

The study hypotheses are formulated as follows:

Main hypothesis $H_{\circ}$: There is no statistically significant impact at (0.05 α) level for risk analysis with its combined dimensions (environmental risks, human risks, operational risks, financial risks) in the criteria for determining public buildings with their dimensions (cost, human resources, competitive advantage).

The following sub-hypotheses emerge from the main hypothesis:

$H0_1$: There is no statistically significant impact at the level ($0.05 \geq \alpha$) for risk analysis with its combined dimensions (environmental risks, human risks, operational risks, financial risks) on cost

$H0_2$: There is no statistically significant impact at ($0.05 \geq \alpha$) for risk analysis in its combined dimensions (environmental risks, human risks, operational risks, financial risks) on human resources

$H0_3$: There is no statistically significant impact at (0.05 α α) level for risk analysis with its combined dimensions (environmental risks, human risks, operational risks, financial risks) on the competitive advantage

1.6 Study Organization

Figure 1-1 outlines the organization of the study which is divided into five chapters, namely a summarized informative introduction of the study which covers the problem statement, the significance of the study, the objectives, and the questions of the study. Then, the literature review defines the aspects of the topic and other researchers work related to the topic studied and the outcomes they obtained, the research methodology, the results analysis, and finally, the recommendations for future work and conclusions. Besides, the references list is provided and formatted based on APA style.

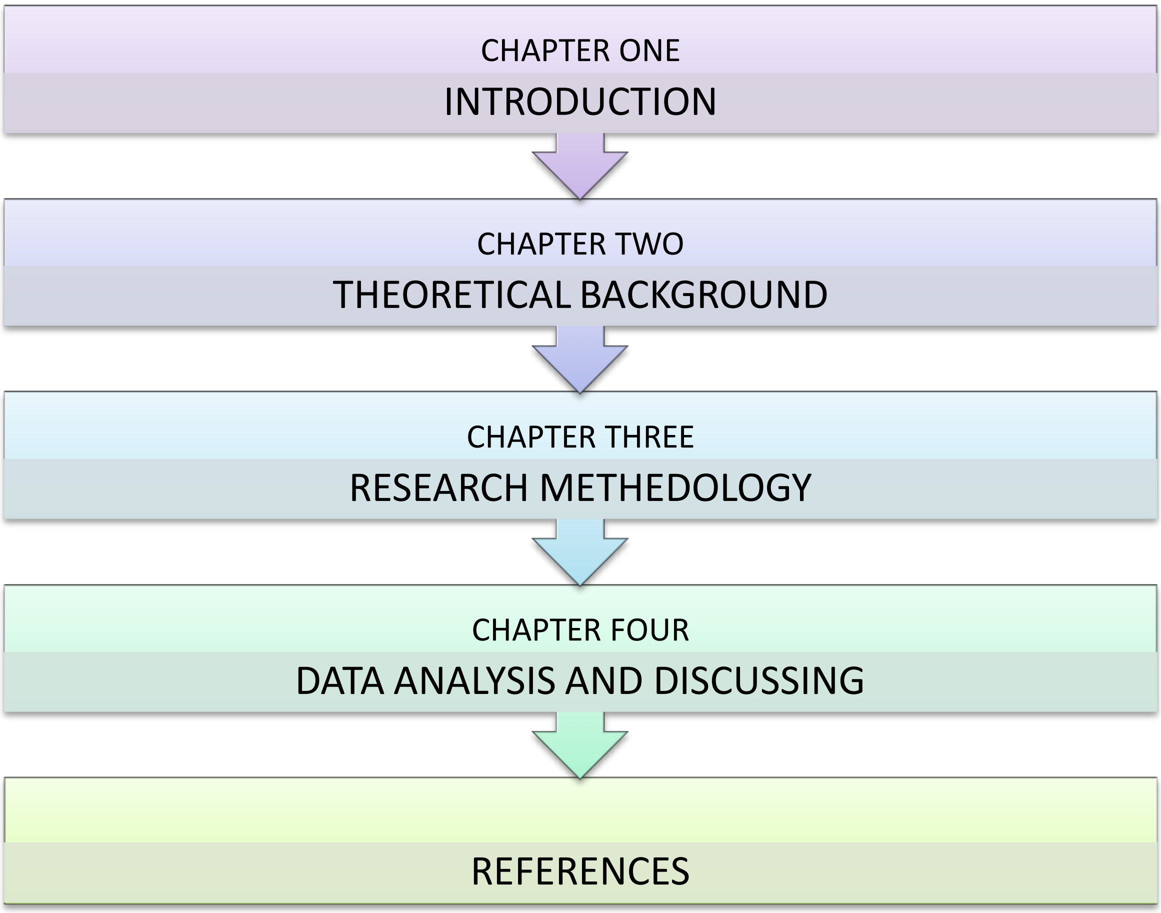

Figure 1-1: Study organization

Chapter Two
Theoretical Background

Site selection process for public buildings specifically the educational and health sectors is important aspect of the countries' development. Chapter Two tackles the topic in more detail by elaborating the definitions, highlighting the theoretical background, and reviewing the most relevant previous studies.

2.1 Risk Management

Risk management is considered one of the most important steps in any project, this process must be adapted with the idea of the project because it deals with the risks that might be encountered during the lifetime of the project. Risk management attempts to avoid losses such as financial loss, possible health loss, and delays in the timeline of the project. Risk management is, debatably, the most crucial step in the safeguard of workers. Driven by hazard, exposure, and risk information, risk management includes evaluating the extent of risks and determining the most suitable exposure control measures (Schulte et. al, 2013). Risk management has always been connected with the use of market insurance to protect individuals and companies from numerous losses related to accidents (Harrington & Niehaus, 2003).

Tohidi (2011) defines risk management as the practice of identifying and assessing risk, and to apply procedures to reduce it to a tolerable amount, it is a systematic approach to dealing with risk. According to (Edwards & Bowen, 1998) a risk management system must: create an appropriate context; establish goals and objectives; recognize and analyze risks; impact risk decision-making; and observe and review risk responses. figure 2-1 lays out the steps of this process in a general layout.

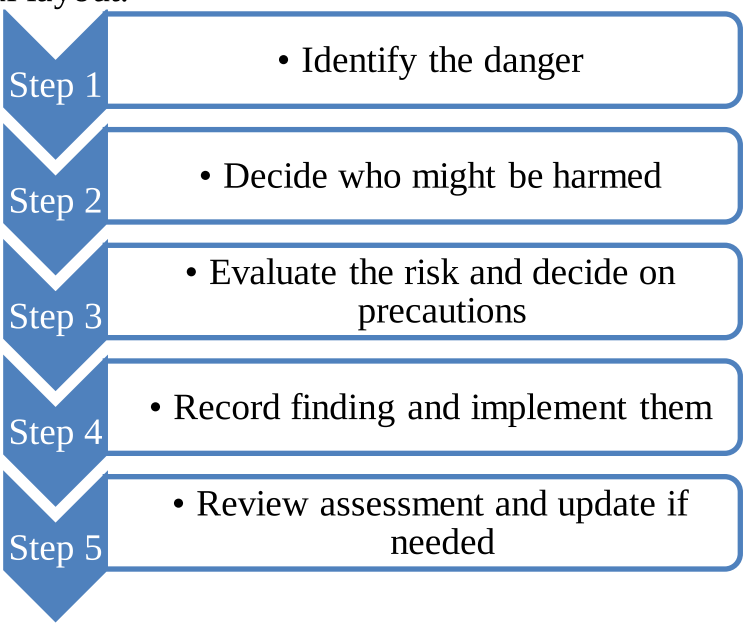

Figure 2-1: Steps of risk management (Five steps to risk assessment, 2011)

As shown in figure 2-1, the first step is to identify the risk that the project may encounter, it is important to note that all the steps must be implemented in every part of the project. As the idea of the project is presented, there must be a study of the potential risks, and who might be greatly affected by the health risks, financial risks, etc. It is impossible to identify and avoid all risks; however, some risks have more impact on the projects than others so they must be particularly addressed in advance.

All risks and procedures to solve them must be considered by the risk management team to study them and avoid them in the future planning of the current project or upcoming projects (Serpella et.al, 2014). Researchers came up with many important recommendations about risk management to summarize some (Serpella et.al, 2014):

1. It is necessary to prioritize the risk management skills of the project managers due to the instability of the conditions in any project and the presence of risks that the project may face.
2. It is essential to enhance the risk management skills of project managers through improving and developing special comprehensive training in risk management, administration, and financial fields.
3. Risk management should be an integral part of each phase and action of the project. Also, it must be managed within every team and specialty team's agenda.

2.2 The Origin of Risk Management

The risk management originated from the collaboration of engineering applications in military programs, space theory, and financial insurance in the financial sector, and the shift from relying on insurance management to the idea of risk management based on management science. The scientific method analyzes cost, return, and expected value to simplify the decision-makers' mission under conditions of uncertainty. The first appearance of the term risk management was in the Harvard Business Rigo magazine in 1956 where the author then put forward a completely different idea stating that someone inside the organization should be responsible purely for managing the organization's risk. Among the first institutions that managed their risks are banks that focused on managing assets and liabilities and found that there was a more effective way to deal with risks by preventing losses and minimizing their effects as it was impossible to avoid them (Sumani, 2009).

The use of risk management has spread in institutions, especially financial ones, such as insurance companies and investment funds. Although risk management was built upon principles from purchasing insurance, the statement that risk management arose naturally from buying insurance contradicted the truth. The emergence of risk management was a drastic shift. A change in the direction towards insurance, where insurance was the primary means or approach, was used to deal with risks. There has been a transition from insurance management to risk management over some time as the risk management movement in the business community has coincided with the occurrence of revaluation of business school curricula (Abdali, 2012).

The philosophy of risk management seemed logical and reasonable and spread from one institution to another. When the Insurance Buyers Association decided to change its name to the Risk and Insurance Management Association in 1975, the change was a sign that a shift was taking place as the Risk and Insurance Management Association began publishing a magazine called "Risk Management". Also, The Insurance Department of the American Management Association was publishing a wide range of reports and studies to help risk managers. Besides, the American Insurance Institute developed an educational program in risk management that includes a series of exams wherein the successful students obtain a certificate in risk management, and the curriculum has been modified. The school in 1973 created a professional name for graduates of the program "Risk Management Fellow". Thus, this leads to a spread of use risk management in the business world (Tariq, 2007).

2.2.1 Classifications of Risks

Risks are anything that might threaten the project at any stage; projects could financially threaten. The timeline of the project could be negatively affected to the extent that the performance of the project team or even end the project completely failed (Ridha & Alnaji, 2015). Risks are classified into the following categories according to (Kremljak & Kafol, 2014):

1. Strategic risk: macroeconomic risks, bad business decisions, and strategic direction of the organization.
2. Financial and business risks: market risks, credit risks, and any financial problem.
3. Operational risks: risks related to failures in management, systems and software, human-related errors, process, and procedural inadequacies.
4. Regulatory risks: risks related to organizational and governmental regulations such as permits.
5. Technological risks: risks related to the operation of technology and its compatibility with the organization and the project.
6. Environmental risks: risks that occur due to not following the global environmental regulations such as water quality rules or pollution-related laws.
7. Technical risks: design-related issues.
8. Organizational risks: risks related to staff problems such as inexperience, or losing key staff members, insufficient time to plan adequately, having no on-time decisions, or an overload of work.
9. Constructional risks: inadequate construction time planning and lacking the right permits or utilities.

10. External Risks: problems that occur due to changes in funding, problems with the community, inconsistent costs, and inability to procure lands.

2.2.2 Risk Analysis Techniques

Risk analysis is an activity within risk management that is concerned with analyzing risks and try to find solutions for them (Holton, 2011).

There are many classifications of risks in each literature they are categorized or classified based on a certain view. The classification displays the most common and familiar techniques of analyzing risks other than the previously mentioned classification. Accordingly, risks are divided into two groups: upside risk; which highlights the possibility of gain (opportunities), Downside risk; which highlights the possibility of loss threats (Holton, 2011, Visser & Joubert, 2008).

The following table suggests techniques for analyzing risks:

Table 2-1: Risk analysis techniques (Visser & joubert, 2008)

Risk Type	Analysis technique
Upside	1. Market survey
	2. Research and development
	3. Test marketing
	4. Business impact analysis
	5. prospecting
Downside	1. Threat analysis
	2. Decision tree
	3. Failure Mode and Effects Analysis
Both	1. SWOT analysis
	2.Dependency modeling
	3. Event-Tree analysis
	4. Statistical inference
	5. Measures of central tendencies and dispersion
	6. PEST analysis
	7. Business planning
	8. BPEST analysis
	9. Real option modeling

2.3 Risk Management in Construction

As construction projects are done only once and are very difficult to change or adjust, the risk factor is considered to be very high. The risk factors occur as the teams within the construction process change and rotate because the tasks and needs keep changing. Besides, the locations and size of the building keep growing which imposes more risks especially life risks on the on-site teams (Tamošaitienė et al. 2013).

Usually, risk management within a construction project leads to less revenue to the owner because it usually means slower operations and more money spent on safety procedures. Accordingly, risk in such projects is perceived differently in the eyes of each party in the project – contractors, owners, designers, etc. Thus, each party must identify and evaluate potential risks from their point of view and manage them (Serpella et al. 2014).

The way how the project management team works and makes decisions has a great impact on the success rate of the construction project. Below are some of the accompanying risks that occur due to bad decisions made by the team (Banaitiene & Banaitis, 2012):

Uncertain or unachievable project objectives, bad scoping, bad estimation, budget established based on inadequate data, contractual problems, insurance problems, delays, quality problems and insufficient time for testing.

According to the surveys conducted by Banaitiene & Banaitis (2012), the top three main internal risks are 1. Construction risks; 2. Design risks; 3. Project management risks and the top three main external risks are 1. Fiscal policy; 2. Natural forces; 3. Political controls.

There are ten groups of risks related to the construction industry (Renault & Agumba, 2016):

1. Design: Flawed design, imprecise quantities, inconsistent design, inadequate drawings, and specifications.
2. Physical risks: Accidents due to bad safety procedures.
3. Logistics risks Inadequate site investigation, imprecise project program, lack of employees, materials, and equipment, the vague scope of working, bad communications between the home and contractors.
4. Legal risks: Unclear work legislation, struggle to obtain permits, postponed dispute resolutions.
5. Environmental risks: Opposing weather conditions, trouble accessing the site due to distance, natural disasters (floods, earthquakes, etc.).
6. Construction risks: Misunderstandings between the design team and the contractor that result in inconsistencies between the design and actual work, problems with the real-life quantities of supplies and materials, and the bids in place.
7. Management risks: Bad communication between the project teams, unclear planning due to project difficulty.
8. Cultural risks: Religion, cultural traditions, and community norms.
9. Financial risks: Postponed payments on contract, bad financial planning, and management.
10. Political risks: New governmental laws or legislations.

Managing the risk in the construction sector is very difficult due to the complication and size of the project, competition, politico-economic challenges, client-consumer requirements, and major difficult physical circumstances.

Risk Management in this sector may lead to multiple profits such as recognizing the best option to solve a problem, identifying project objectives more accurately, higher success rate, fewer mistakes, more accurate estimates, and reduced redundant effort.

2.4 Master Plan

When discussing the construction of a public building for urbanization, the concept of the Master Plan arises. A master plan is identified as a document that tries to plan a project from the beginning to a futuristic view of the project. It provides a framework guideline to all the contributors and aspects of a given project. It is created in such a manner that it includes all involved internal and external parties in the project such as the development phase workers, owners, future workers, stockholders, governmental parties, and the community surrounding the project (Nallathiga, 2016).

A master plan has two general groups (Barbarossa et. al, 2018):

1. Operational master plans; such plans are short-termed and they tackle immediate events or actions. They do not have a broad perspective of the project this type of master plan is not always the go-to type of plan.

2. Long term master plans; have a long-term view of the project and try to give a very comprehensive plan or guide to many possible parts of the project to make sure they develop with the least amount of errors and risks.

The reasons for creating a master plan are summarized as follows (Barbarossa et. al, 2018):

1. Support – the creation of a master plan creates a strong basis for the community to rely on, it creates a trustful element between the community members and the constructed facility.
2. Timelines – The master plan helps expose issues and problems that may occur during the timeline of the project and help the project team and owner sole such issues and avoid future problems and failure.
3. Cost-Effectiveness – When the plan is being created most of the problems and issues or even the opportunities, materials, and needs are being identified and listed which creates an opportunity to manage costs and find feasible solutions.
4. Understanding – The master plan is so comprehensive that it involves all the aspects of the project and the community within it; therefore, it is a reference for everyone to understand and identify the aspect and responsibilities of the project.
5. Compliance with Government Priorities – Such a plan creates an easy process to follow all laws and regulations and gives the project team the ability to clearly state their needs and procedures in a way that it complies with the regulations.

Figure 2-2 shows the process of creating a master plan:

Figure 2-2: The process of creating a master plan (Barbarossa et. al, 2018).

Characteristics of the Master Plan (Nallathiga, 2016):

1. Physical: Guides the physical aspects of the project which is the construction.
2. Long-ranged: Covers the whole life span of the project including future views.
3. Comprehensive: Tries to view the project as a part of a whole community that is attached to it.
4. Decision-making guide: It helps decision-makers select the best possible decision by providing them with available information.
5. Statement of public policy: Reflects the policies, views, principles, and traditions of the community into the project.

Figure 2-3 lays the concepts that are covered within the master plan.

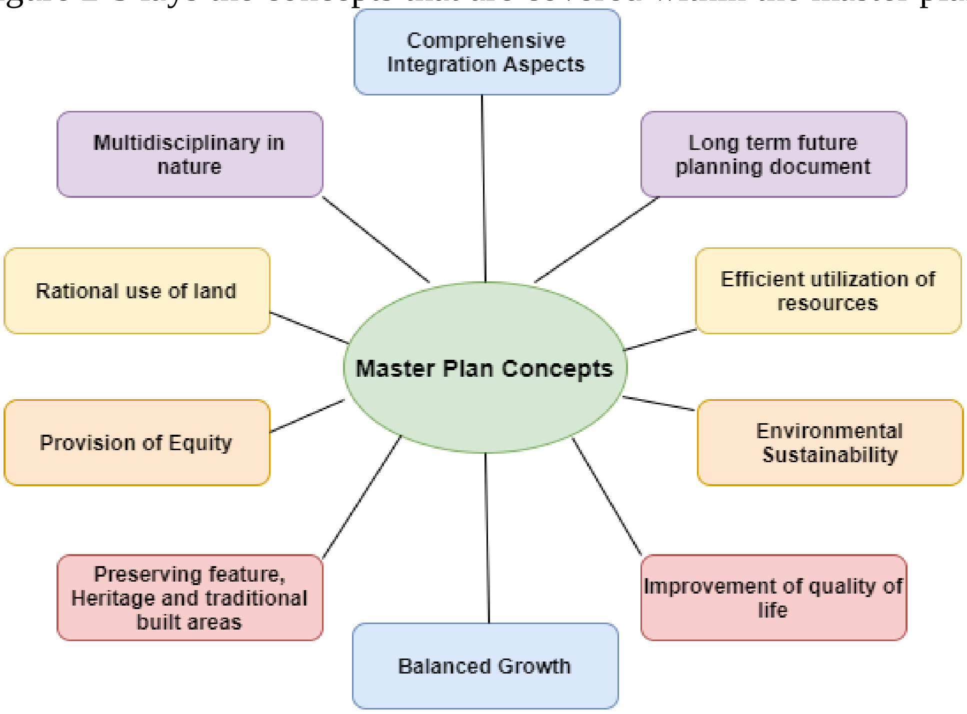

Figure 2-3: Master Plan Concepts ("Concept, Basic Characteristics & Preparation of Master Plan", 2020)

Sections of the Master Plan (Nallathiga, 2016 and Concept, Basic Characteristics & Preparation of Master Plan, 2020):

1. Vision. 2. Land use. 3. Facilities of the community. 4. Economic development plans. 5. Natural hazards. 6. Public services and utilities. 7. Housing. 8. Neighborhoods. 9. The design of the community. 10. Concerns of the region the project is within. 11. Cultural concerns. 12. Natural resources. 13. Transportation. 14. Implementation strategies.

To decide how to form the master plan, the following must be considered (Concept, Basic Characteristics & Preparation of Master Plan, 2020):

1. The available budget.
2. Problems of the community.
3. The goals and objectives the community is aiming for.
4. Your previous experience while planning.
5. Try to predict future economic and population rates.
6. Land availability within the community for any future developments.
7. The statutes of the public services and facilities to support any community changes.
8. The type of master plan chosen and the project planning techniques.
9. Many reasons prompt the creation of a master plan:
10. Community growth rate, which may affect the ability for site use and development.
11. Prospect of population reduction which might result in failure or loss of the project.
12. The project owners look forward to changing or addressing some of the problems in the community.
13. Opportunities for changing the project goal, aim, or nature.
14. Possibility in a change of the neighboring land use.
15. Concerns about the size of the site.
16. The need for a clear plan for investment and capital allocation.
17. Cases of disaster.
18. Proposed new infrastructure of the area.
19. Change of heart by the stakeholders.

2.5 Construction Projects Phases

Projects in construction differ in size, the number of stakeholders, budget, and delivery date. All construction projects follow a set of phases regardless of the size or the complexity of the project (Karna et. al, 2019 and Enshassi et. al, 2018):

1. Pre-construction phase (Development of plans, Specification, Financing, Budgets, and Permits)

In this phase, the following must be carried out:

1. Site selection.
2. Create final working plans.

3. Identify specifications.
4. Prepare the cost analysis sheet.
5. Prepare a comprehensive construction budget.
6. Develop homeowner allowances.
7. Create site and landscape plans.
8. Agree on construction contracts.
9. Determine materials and exterior design of the building.
10. Obtain local government approvals and permits.
11. Secure financial needs and funds.

2. Initial construction phase.

1. Prepare the foundation of the building.
2. Build floor systems.
3. Build the wall systems.
4. Build a roofing system.
5. Build an exterior wall.
6. Install vapor barrier.
7. Install a roof covering.
8. Install windows and doors.
9. Initial walk-thru inspection.
10. Prepare to plumb.
11. Prepare electrical.
12. Prepare HVAC systems.
13. Mount exterior surfaces.

3. Final phase.

1. Mount insulation.
2. Mount trim and moldings.
3. Paintwork.
4. Mount electrical fixtures.
5. Mount kitchen and bathrooms.
6. Finish plumbing fixtures.
7. Mount another built-ins.
8. Floor work.
9. Complete drives walk, garages.

4. Post construction phase.

1. Conduct final inspections by the homeowner, building inspector, municipal inspector
2. Secure permanent financing for future development and sustainability
3. Establish the date for turning in the building
4. Figure 2-4 shows the construction project phases.

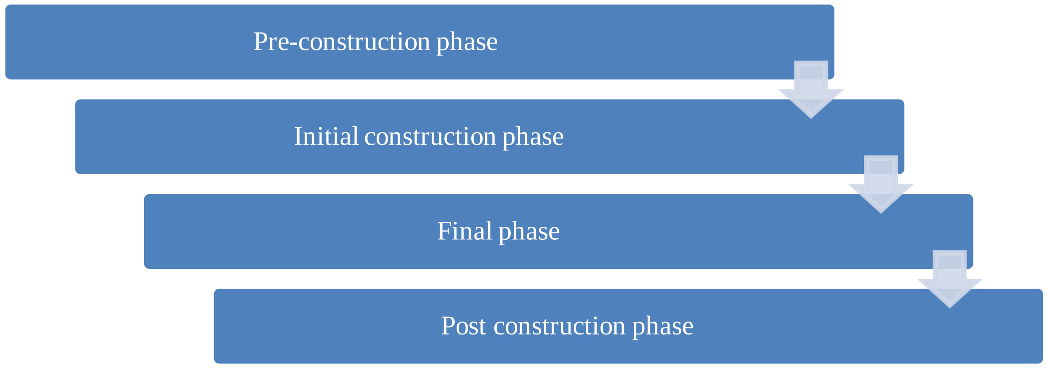

Figure 2-4: Construction project phases (Karna et al. 2019).

2.6 Site Selection Process for Public Buildings

Site selection is the process of screening multiple options and assessing their advantages and disadvantages. Site selection comes after the needs assessment has been completed. When selecting a site before the need's assessment, one can waive the key design aspects due to site restrictions (Druķis et al. 2017).

Site selection is the first and most important step health care organizations take when developing a new facility. In addition to choosing a plot of ground, many factors go into the selection of a facility site — from the size and cost of a parcel of land to its visibility, its proximity to other health care facilities, and how quickly it can be developed. Site selection is a multifaceted issue that has the potential to influence the rest of a project and, eventually, the success of the resulting facility (Cich, 2017).

Public utilities and services buildings are urban tools and devices used to provide services needed by the inhabitants. Thus, health, education, and community facilities must be available in urban areas.

In general, the sustainability and development process aspects of the site selection process should focus on the selection of sites. Selecting sites must consider the following (Cich, 2017):

1. Has a minimum negative effect on the environment.
2. Has the least possible threats from the environment.
3. Needs minimum extraction of natural resources to prepare the site and construct it.
4. Includes community-managed and infrastructure systems for reducing and managing liquid and solid waste.
5. Considers the characteristics and the culture of the residents in the area.

Based on a local civil engineer, with experience in the site selection process, the following are the main criteria to take into consideration when selecting a site (Farkas, 2009 and Cich, 2017):

1. Nature and objective of the project/building:

Determining the goal or objectives for setting up any project is the main factor for studying the project area. It is necessary to determine the target group of the project and the reasons for its establishment and field of work, for example, it is not logical for the government to establish a school in an unpopulated area where it is a waste of public money and does not achieve the goal from the establishment. Also, it must be considered that a project is set up to serve the local community. Therefore, when selecting the project site, the objectives must be identified in advance. Economic, moral feasibility for a project, the extent of its success and consistency in that region must be decided before setting up the project.

2- The transportation network:

The transportation networks and the roads leading to the project form the main nerve for vital operations and the flow of raw materials and employees to the project's campuses. Therefore, the risks that may arise from the distance of the project from the transportation network are as follows:

1. Difficulties in the stream of entry and exit of heavy machinery into the project.
2. Problems with the access of the employees to the project and thus raising the transportation cost for the contractor and the employer.
3. Increasing the cost of construction materials due to the project's proximity to the transportation network.
4. Increasing the time required to complete the project, as the transportation network and places of stifling traffic crises affect the time planned to be completed.

2.7 Environmental Impact Assessment (EIA)

Environmental Impact Assessment (EIA) is the process of evaluating the environmental consequences of a plan, policy, program, or any other project before the execution of the proposed action; it is the primary instrument for development planning and decision-making (Mora-Barrantes et al. 2018).

EIA is not a once-in-a-lifetime process that ends with a report of the project on the effects of it and related mitigation measures. It also deals with observing the construction and operational stages, and this is carried on till the project is over. Post-construction care is also an important part of the EIA process, which goes back to the nineteen seventies. Environmental impact assessment acts as a baseline of the conditions in the area of the construction and to proactively evaluate the possible impacts and related impacts of the project on the project area (Lattemann and Höpner 2008).

EIA refers to the expected various effects that a project will have on the environment and the local community (Selvakumar and Jeykumar 2015) and, where it aims at ensuring the environmental impacts predicted by decision-makers are taken into consideration during project expansion. The EIA has become an influential tool that is used to recognize the environmental, social, and economic effects of a project before the decision-making process.

According to the type of the project and the effect it will have, the EIA can be conducted by two types. They are (Mishra 2020):

1. Rapid EIA

1. This is implemented for projects having limited impacts.
2. Baseline data (or) information is collected for only one phase of the project.
3. Time frame is Shorter (3 months)

2. Comprehensive EIA

4. This is implemented for projects having multiple adverse impacts.
5. Baseline data (or) other related information for multiple/ all of the project phases.
6. Time frame is more than a year.

EIA objectives vary but mainly can be summarized as follows (Mishra 2020):

1. Establish the current bio-geo-physical and socio-economic conditions of the area of the project.
2. Recognize the effects both positive and negative related to the construction and operation of the project.
3. Give recommendations to remove/mitigate/control the scale and significance of the identified effects.
4. Recommend a plan and processes to manage the consequences and
5. To incorporate the opinions of stakeholders, environmental regulations, codes, and agreements relevant to the proposed activities into the final project design from the EIA report Review.

EIA process and phases (Selvakumar and Jeykumar 2015):

1. Scooping; identifying key issues that must be addressed in an EIA Impact assessment and evaluation;
2. Impact moderation and monitoring;
3. Reviewing the finished Environmental Impact Statement and;
4. Public participation.

The outcome of the EIA is gathered in a document named Environmental Impact Statement (EIS) which lays out all the positive and negative effects of a specific project on the environment. This report resembles one component of the information needed to help decision-makers in making their final decision about a project (Selvakumar and Jeykumar 2015).

EIA is considered a mechanism that capitalizes on the efficient use of natural and human resources. It also decreases costs and time used to decide by making sure that the subjectivity and repetition of effort are minimized, also recognizing and trying to evaluate the primary and secondary consequences which might need expensive pollution control equipment or reimbursement and other costs later on (Lattemann and Höpner 2008).

The word Environment in the EIA concept focuses on physical, chemical, biological, geological, economic, social, and aesthetic aspects along with complex interactions between them, which would, affect individuals and communities and ultimately determining their forms, relationship, character, and survival (Lattemann and Höpner 2008).

Sustainable development is built on three basic pillars: economic growth, ecological balance, and social progress. Economic growth achieved in a way that does not consider, the environmental concerns, will not be sustainable in the long run.

Nevertheless, sustainable development requires careful integration of three components; environmental, economic, and social, to accomplish an improved standard of living in the short term, and gain or equilibrium among natural, human and economic resources to support future generations in the long term. “It is necessary to understand the links between environment and development to make development choices that will be economically efficient, socially equitable and responsible, and environmentally sound (Mishra 2020).

2.8 Traffic Impact Analysis (TIA)

Traffic Impact Assessment (TIA) is a study conducted to consider the impact of generated traffic that a development project has on a nearby transport network and to recommend the necessary measures to reduce the negative impact. Besides, the TIA is an important document to help authorities make land use and urban planning decisions, it can be used to assess whether a development proposal is appropriate and what improvements to transport facilities should be made. in the long run to sustain sustainable development (Toan and Van 2020).

Also, TIA includes a standard step-by-step method for determining the impact on traffic and transportation. Also, help decision-makers look at the impact and improve communication between the various stakeholders involved. This assessment, together with support for environmental impact assessment, development planning and management, land use policy, and resource approval, will provide important information and knowledge. when deciding on development applications. If this is not reduced in the early stages of land use planning, the growth of traffic will quickly suffocate the already dense state and thus lead to more serious traffic problems such as traffic accidents and fatalities (Padma et al 2020). As we have seen, the majority of road fatalities have occurred in developing countries compared to developed countries including Public buildings locations (May et al. 2019).

The main objectives of the TIA may include (Toan and Van 2020):

1. analyze the impact of developments on the surrounding transport network and recommend the necessary measures to mitigate its negative effects.
2. improve the overall development of the connection, accessibility, and convenience of active and mass transport in connection with wider transport networks.

3. Determine the transport needs of new development and propose adequate and appropriate design measures, facilities, and infrastructure improvements to meet the demand for transport.

TIA has been recognized as an integral and obligatory part of environmental protection assessment in developed countries. However, in developing countries, TIA has only gained importance in the last decade, driven by the need to develop sustainable solutions to the congestion problem (Padma et al. 2020).

When the countries use the EIA to choose the locations of the public building and the import and adaptation of effective policies and countermeasures in developing countries with essential methods and means, leads to prevent traffic problems and accidents

2.9 Types of a Public Building

There are different types of Public Building, such as:

1. Agricultural, educational, industrial, commercial, military, parking lots, religious, transportation facilities, health facilities.
2. Sanitary blocks, circulation, entrance or reception, parking space, garages, cycle stands and watchmen’s room.

2.10 Previous Studies

To assess, allocate, and identify risk in public project constructions in Jordan, researchers tried to reduce the cost of public constructions. Risk factors were identified and analyzed via a literature review and a questionnaire (Hiyassat et. al, 2020). The results of the research show that the impact of identified risk can help in the project objectives, and the risk is more capable to control, assesses, and manages.

Multi-criteria decision-making techniques were used to site selection methods for sustainable tourism in cost in (Abed et. al, 2011) study. Also, literature was reviewed and analyzed, the site selection procedure was developed by Boolean logic and hierarchy process, according to their criteria.

A system for risk-based assessment of public buildings legislation in the field of European aims to classify the risk for safety, and analyze issues provide the inspection method for assessment of existing buildings. A novel method was implemented, described complies with requirements. After a sample test is implemented, the results accordingly show a performance assessment tool that analyzes the effect of risk factors on the safety of public buildings (Druķis et al. 2017).

Dziadosza & Rejmentb (2015) present three methods of risk analysis, also highlighting their disadvantages, advantages, and primary areas of application for Risk analysis in construction projects. They analyze the methods using statistical analysis. The confirmation was started from the simplest techniques by some qualitative variables. The areas of application and analytical ability of the documented methods are proved with short examples. The most prevalent methods of project risk analysis: (the matrix of risk or sometimes the Ishikawa's diagram) for identification and preliminary assessment of risk and (the multi-attribute and the statistic approach) for supporting the decision-making procedure in the valuation and selection of projects.

A theoretical framework for planning a system of public service centers presented by (McAllister, 2010) focusing on the major forces, but it does not attempt to provide a complete guide to all considerations in any specific application. The method should be time-efficient, simple for use, easy for reporting, and clear for society and stakeholders. There are massive numbers of different assessment methods for the safety of buildings, but they are also very complex, or time overriding. Also, they may not cover all safety features (essential requirements). When planning a specific public service system for a specific area, it will be essential to adjust this framework to take account of factors such as more complex demand and cost determinations, spatial and temporal variations in population density and characteristics, possible congestion effects, and multiple hierarchies.

Nikolakaki (2004) in his research presents the development of a methodology for identifying and prioritizing potential sites for environment creation, using GIS technology. It describes a system to support local land-use decision making by organizing the best accessible knowledge about ecological processes and classes response in a fragmented landscape into the quantification of spatial parameters.

One of the most important public buildings is schools (Moussa et al. 2017). They achieve a guideline for school's locations through educational public facilities planning, location, definition, and impact on the city development. School location affects directly the health and life of the children, if children live at a closer distance to the school there is a better chance that they will bike or walk to school. Besides, case studies were analyzed to achieve general guidelines for a school location.

Hospitals and clinics are also important buildings that need to be chosen carefully. New objectives multi-step approach was developed to improve clinical site selection (Hurtado-Chong et al. 2017). The method was employed based on the use of network definition criteria of the systematic screening process. As a result, clinical site selection with a standardized and objectives method was encouraging, also a guideline for other researchers performing multicenter studies.

Also, Şahin et. al (2019) proposed a decision support model for site selection to start a new hospital based on the analytic hierarchy process (AHP). The main purpose of the research is to select the best site for a hospital in Turkey. The research was based on 6 criteria and 19 sub-criteria. Accordingly, the analysis of the hierarchy model was directed using the Super Decisions 2.2.6 software program. Results show that "demand" is the most important factor, followed by accessibility, competitors, government, related industry, and environmental conditions. According to the results, the best site was chosen to establish a new hospital.

The main goal of the study of (Ghodousi & Sadeghi-Niaraki, 2019) is to locate the public libraries based on indicators of centrality, consistency, and natural features of the ground. To identify the major criteria for the site selection of the libraries, a survey, a descriptive practical nature, and quantitative approach methods were used to collect the data. To normalize the criteria maps, fuzzy functions were used; to weigh the site selection criteria, the Fuzzy Analytical Hierarchy Process (FAHP) was used; and to combine the criteria, the weighted linear combination (WLC) was used. The results show that population mass, availability, distance from existing libraries, closeness to educational centers, and closeness to cultural and religious centers have been the most important criteria. By combining the criteria considered in this study, 6 areas had a high spatial fitness for library space. Bojnurd city needs three new libraries that can be selected after the rules are considered.

Due to several problems in site selection and design of ecological buildings, (Jin & Quan, 2019) in their research proposed an effective method of ecological building site selection based on GIS (Geographic Information System) and BP neural network technology, which successfully solves several problems in the procedure of ecological building site selection. The results after the analysis of the site selection of ecological buildings show seven factors connected to the site selection of ecological buildings; three factors of them, namely aspect, road, and land use have a more impact on site selection than other factors.

An analytical hierarchy process was used to select the best site location for a retail chain store in Backundol-Nepal. (Karna et al. 2019) analyze literature and contextual studies, in addition to case observation. The results of the research obtained four main criteria and twelve sub-criteria.

After studying and analyzing many studies, we found that the selection process for public or government buildings is necessary. Unfortunately, in Jordan, the standards for choosing public and government buildings, such as schools, hospitals, and others are unclear. Therefore, we will try in the current study to determine some standards that may be applied in choosing such buildings. Adopting the standards for choosing a government and public buildings helps in project goals, reducing risks, reducing costs, and the ability to evaluate the work of those in charge of the project.

Table 2-2: Summery of the related works

Author Name	Research Name	Year	Idea	Objectives & Results	The Research Gap
Hiyassat et al.	Risk allocation in public construction projects: the case of Jordan	2020	Assess allocate and identifies risk in public projects constructions in Jordan to reduce the cost.	The impact of identified risk can help in the project objectives, and the risk is more capable to control, assesses, and manages.	A wide range of actions with social, environmental, and economic and safety, dimensions in many sectors, and security of people and communities.
Karna et al.	A Study on Selection of Location by Retail Chain: Big Mart.	2019	An analytical hierarch process was used to select the best site location for a retail chain store.	Obtained four main criteria and twelve sub-criteria.	The study focuses on public construction projects
Sahin et al.	Analytic hierarchy process for hospital site selection	2019	investigated a decision support model for site selection to establish a new hospital based on the analytic hierarchy process.	Demand is the most important factor in determining the appropriate hospital site, followed by accessibility, competitors, government, related industry, and environmental conditions.	Site selection for public construction projects including hospitals provides a systematic and objective approach to site selection.
Ghodousi & Sadeghi-Niaraki	Site Selection of the Public Libraries of Bojnourd City in Iran Using FAHP	2019	To locate the public libraries in Bojnourd based on the indicators of centrality, consistency, and natural features of the earth.	Population density, accessibility, distance from existing libraries, respectively, have been the most important criteria to locate the public libraries.	Site selection for public construction projects including libraries provides a systematic and objective approach to site selection in Jordan.
Jin & Quan	Research on Site Selection of Ecological Buildings Based on GIS Technology	2019	An effective method of ecological building site selection based on GIS (Geographic Information System) and BP neural network technology is proposed.	Successfully solves several problems in the procedure of ecological building site selection.	A wide range of actions with social, environmental, and economic and safety, dimensions in many sectors, and security of people and communities.
Moussa et al.	School site selection process	2017	Achieve a guideline for school's locations through educational public facilities planning, location, definition, and impact on the city development.	The system aims to improve safety in the external workplace.	Site selection for public construction projects.
Druķis et al.	Inspection of public buildings based on risk assessment	2017	A system for risk-based assessment of public buildings legislation in the field	Results accordingly a performance assessment tool	A wide range of actions with social, environmental, and economic, also in

			of European aims to classify the risk for safety.	that analyzes the effect of risk factors on the safety of public buildings.	safety.
Hurtado-Chong et al.	Improving site selection in clinical studies: a standardized, objective, multistep method and first experience results	2017	A new objectives multistep approach was developed to improve clinical site selection.	Clinical site selection with a standardized and objectives method was encouraging, also a guideline for other researchers performing multicenter studies.	Site selection for public construction projects including clinics provides a systematic and objective approach to site selection.
Dziadosza and Rejmentb	Risk analysis in construction project-chosen methods. *Proce dia Engineering*	2015	Highlighted their disadvantages, advantages, and primary areas of application for Risk analysis in construction projects.	The matrix of risk for identification and preliminary assessment of risk for supporting the decision-making procedure in the valuation and selection of projects.	Risk analysis for public construction projects provides a systematic and objective approach to site selection.
Abed et al.	Site selection using Analytical Hierarchy Process by geographical information system for sustainable coastal tourism	2011	Multi-criteria decision-making techniques were used to site selection method for sustainable tourism in cost.	The results showed the most coasts priority of candidate's areas.	Using Quantitative and Qualitative research
McAllister	Equity and Efficiency in Public Facility Location. *Geog raphical Analysis*	2010	Presents a theoretical framework for planning a system of public service centers.	It will be essential to adjust this framework to take account of factors such as more complex demand and cost determinations.	Risk analysis for public construction projects, to provides a systematic and objective approach to site selection, to provides a systematic and objective approach to site selection.
Nikolakaki	A GIS site-selection process for habitat creation: estimating connectivity of habitat patches. *Landsc ape and Urban Planning*	2004	The research presents the development of a methodology for identifying and prioritizing potential sites for environmental creation.	describes a system to support local land-use decision making by organizing the best accessible knowledge about environmental processes	A wide range of actions with social, environmental, and economic and safety, dimensions in many sectors, and security of people and communities.

Chapter Three
Study Methodology

3.1 Introduction

This study follows the descriptive and analytical approach; this type of scientific approach is concerned with determining the characteristics of the sample in quantitative terms. The analytical approach will be used to define and evaluate the relationship between the study variables and the impact of the independent variable risks analysis in its dimensions (environmental risks, human risks, operational risks, financial risk, etc.) on the dependent variable, criteria for determining public buildings with its dimensions (cost, human resources, competitive advantage). The descriptive and analytical approach is one of the appropriate approaches in administrative studies and engineering management that depends on the opinions and orientations of the study sample.

The researchers developed two tools to collect data through two questionnaires; the first was directed towards the study population, namely civil engineers and architects. It is considered the main tool on which the researchers relied on testing the hypotheses of her study while the second questionnaire was directed to the population to know their orientations about the potential risks in choosing public sites such as hospitals and schools.

An attempt was made to communicate with many engineers who work in various locations in the public sector, such as the Region Authority, the Development Corporation, and the Ministry of Works to collect information related to the approval of construction sites. Additionally, the researchers obtain an official letter from the Mutah University addressed to the Public Security and Traffic Department to facilitate her mission. The Traffic Department can determine the number of run-over accidents in front of public buildings and the number of traffic violations as a result of discoordination. Unfortunately, due to the difficulty of procedures and correspondence, detailed information was not completely obtained.

according to the annual traffic report in Jordan for the year 2019, there were 161511 accidents which resulted in 643 deaths and 17013 injuries varying from severe to mild, with 3661 of these accidents are considered a running over the type of accident, with a financial loss of 324 million Jordanian dinars. According to the report, there has been a significant increase in the number of cars in Jordan from one car for every 58 people back in 1971 to one car for every 6 people in 2019. Moreover, all that considered a huge increase that has multiple impacts that must be considered when planning for the construction of public buildings and the capacity of the parking lots assigned for such buildings to ensure the satisfaction of the services provided and ease of access along with ensuring the laws of the country and enforced and the safety of the public is addressed.

Besides, the researchers contact a large number of engineers working in the public sector to find out if there are any laws or legislation related to the selection of construction sites. Consequently, everyone states that the building sites are chosen based on a "main or master plan". Her is some pictures of public buildings in Aqaba, it's clear that there is traffic jam and no parking and many buildings are in the same street and very closed together:

3.2 Data collection sources

There are two sources of collecting data, namely:

1. Primary sources: The data collected by the researchers through the questionnaire.
2. Secondary sources: It includes literature and previous studies that were relied on building the theoretical framework and information related to the study variables.
3. Phone calls to a group of engineers.

3.3 Study Population

The study population consisted of civil engineers and architects working in the government of Jordan where a sample commensurate with this community was chosen through the convenience of sampling, to determine the required sample size, the Steven Thompson statistical equation was used, as according to Appendix No. (3), which shows the number of civil engineers and architects affiliated with the Jordanian Engineers Association, the number of civil engineers was 752 and the number of architects reached 106 engineers, with a total of 858 engineers and thus according to the statistical equation The required sample size was 266 engineers, and after distributing the questionnaire, 104 questionnaires were retrieved, with a recovery rate of 39%.

$$n = \frac{N \times P(1-P)}{(N-1)\left(\frac{d^2}{z^2}\right) + P(1-P)}$$

$$266 = \frac{858 \times P(1-0.5)}{(858-1)\left(\frac{0.05^2}{1.96^2}\right) + 0.5(1-0.5)}$$

The second questionnaire was distributed to the study sample members electronically. The number of questionnaires that were collected from the study community is 104. After examining the questionnaires, they were validated, and therefore the total of the questionnaires that were entered into the statistical analysis is (104) questionnaires. Concerning the population questionnaire, it was also distributed to a group of residents who benefit from the public buildings such as hospitals and schools in the government and after distributing the questionnaire, (223) were valid questionnaires for statistical analysis.

3.4 Study Tool (Questionnaire)

To achieve the objectives of the study, the researchers developed two questionnaires (a questionnaire for engineers and a questionnaire for the population) through which she could collect data on the study variables to measure the impact of risk analysis on the criteria for identifying public buildings.

The first questionnaire (the engineer’s questionnaire) consisted of the following sections:

The first section: Includes personal information about the engineer, such as demographic characteristics and general data (age, gender, academic qualification, years of experience, job title).

The second section: Includes the paragraphs of the dimensions of the independent variable (the level of potential risks in choosing sites for public buildings). There were (38) paragraphs for this variable.

The third section: Includes the paragraphs of the dimensions of the dependent variable (the level of application of criteria for determining public buildings). There were (19) paragraphs for this variable.

As for the second questionnaire (the population questionnaire), it consisted of the following sections:

The first section: Includes general and demographic information about the respondent (gender, age, marital status, work, years of service, educational attainment).

The second section: Includes paragraphs about respondents ’opinions about the level of potential risks in selecting public buildings sites and applying criteria for determining public buildings. There were (10) paragraphs in this variable.

The five-point scale developed by (Likert) was used to evaluate the statements related to the study axes, and the evaluation levels were relied upon as follows:

Table (3-1): Likert scale

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

Likert scale is mathematically treated according to the treatment established by (Akadiri, 2011) where the Relative importance index RII was relied upon, where the scale was classified into five categories as follows:

Table (3-2): Treatment of the five-point Likert scale

Treatment of the five-point Likert scale	
RII	Agreement degree
0-0.2	Low (L)
0.2-0.4	Low-Medium (L-M)
0.4-0.6	Medium (M)
0.6-0.8	High- Medium (H-M)
0.8-1.00	High (H)

3.5 The statistical methods used

To analyze the study data collected through the questionnaire, the researchers employed the SPSS statistical software to extract the results through the following statistical methods:

1. Frequencies and percentages are adopted to determine the measurement indicators in the study and display the characteristics of the study.
2. Arithmetic averages to determine the level of response of the study sample individuals to their variables.

3. Standard deviation to measure the degree of divergence of the responses of the study sample individuals from their arithmetic mean.
4. Exploratory factor analysis to detect construct validity in the items of the questionnaire
5. The Cronbach-alpha reliability factor test to measure the validity of the internal consistency between the items of the questionnaire
6. Skewness coefficient test to verify the normal distribution of the data.
7. Coefficient of VIF to ensure that there is no multiplicity of correlation between the independent variables.
8. Simple and multiple regression analysis to verify the effect of the independent variable on the dependent variable

3.6 The validity and reliability of the questionnaire

To ensure the reliability and validity of the questionnaire, and that this questionnaire can be trusted with the results of its statistical analysis, the researchers have taken three measures to ensure this, namely:

1. Face Validity
2. Construct Validity
3. Questionnaire Reliability

First: face validity

It is used in order to verify that the study tool (the questionnaire) in terms of its possibility of use for scientific research and that it is appropriate for measurement and suitability for this study. This was confirmed through face validity, and the directions of many academics and specialists in the field of engineering management were used. The questionnaire was according to the instructions and directions of the arbitrators, as the inappropriate items were canceled, and the linguistic formulations of the items were also modified in proportion to the study population and Appendix No. (I and II), shows the names of the questionnaire arbitrators.

Second: Construct validity

construct validity is considered one of the most important aspects that must be confirmed before testing hypotheses. Since construct validity expresses the extent to which the items are related to their main dimension, it can be said that construct validity measures whether the items measure what the researchers wanted, and the Exploratory Factor Analysis EFA test was used to verify the construct validity. To make sure of this, the researchers calculated the Factor Loadings, where its value must be greater than (0.30), and that any item whose factor loading was less than that must be excluded due to its lack of construct validity. Ensure the adequacy of the sample size to conduct the exploratory factor analysis test through the KMO Test as one of the conditions for using the EFA exploratory factor analysis is that the sample size is sufficient and good so that the test results are reliable. Regarding the statistically acceptable value of the KMO test, it must be (0.50) as the higher the KMO index, the more the sample size is sufficient and statistically acceptable.

First: the exploratory factor analysis of the first questionnaire (the engineers' questionnaire)

Table (3-3): The construct validity of the first paragraphs of the questionnaire (the engineers' questionnaire)

No.	Item	Factor Loadings	KMO Test
Environmental risks			
1	Environmental risk analysis influences the criteria for identifying public buildings	0.552	
2	Public buildings consider conditions and weather conditions when selecting building sites.	0.753	**0.859**
3	Public buildings take the necessary precautions to avoid the occurrence of environmental disasters such as earthquakes, floods, and fires when choosing the sites of buildings.	0.804	
4	Public buildings when planning to choose a construction site prioritize easy access to the site in emergency situations.	0.781	
5	Consider that public buildings stay away from agricultural areas and avoid harming the green environment when choosing building sites.	0.703	
6	Public buildings are obligated to choose the materials used in the construction process and consider the existence of consistency between quantities, plans, specifications, and standards in order to avoid potential environmental risks when selecting public building sites.	0.771	
7	Public buildings dispose of waste and emissions in a globally recommended methodology to reduce various forms of pollution.	0.724	
8	Public buildings provide appropriate clothing and tools to deal with any environmentally harmful substance.	0.551	
Human Risks			
1	Human risk analysis influences the criteria for identifying public buildings	0.521	
2	The remarkable increase in population numbers as a result of immigration from neighboring countries leads to poor selection of public building sites	0.506	0.743

	due to population pressure and the need to provide buildings quickly.		
3	The fluctuation of productivity rates of machinery and manpower.	0.163	
4	The personnel responsible for establishing public building sites shall comply with instructions and safety procedures.	0.664	
5	The public buildings department undertakes a comprehensive assessment of all employees to match their skills with the work required to be constructed in order to avoid risks.	0.717	
6	Public buildings encourage informal communication between employees and management to provide the best assistance to reduce risks.	0.756	
7	The good choice of location plays a big role in reducing the risk of suffocating traffic crises.	0.255	
8	Traffic analysis is considered when selecting sites for public buildings	0.793	
9	Public buildings consider the history of previous accidents and traffic	0.720	
10	The environmental risk analysis considers the environmental impact assessment.	0.689	
11	Good location selection reduces the risk of severe traffic jams	0.201	
Operational risks			
1	The operational risk analysis influences the criteria for identifying public buildings	0.476	
2	Public buildings provide plans for service networks on-site (such as electricity, water, telephone, and other services) in order to maintain the progress of the work plan.	0.538	0.792
3	Public buildings maintain a consistent design and plan during project implementation in order to avoid hazards.	0.731	
4	Public building sites use high-quality performance standards to check and evaluate the progress of operational processes in comparison with other projects of the institution or others.	0.755	
5	The department trains employees in better use of tools and software. It also provides them with technical skills to	0.800	

	reduce operational risks		
6	Public buildings provide large locations suitable for mega projects, thus encouraging investment.	0.750	
7	Difficulty obtaining licenses and work permits increases site operational risks	0.239	
8	Public buildings follow a single design according to a tight plan to avoid potential operational hazards	0.696	
Financial and business risks			
1	Financial risk analysis influences the criteria for identifying public buildings	0.429	
2	Public buildings consider implementing procedures and policies to systematically identify opportunities.	0.755	
3	The variation in the economic level of the population leads to poor selection of the locations of public buildings according to the inhabited area	0.681	0.770
4	Regular site maintenance results in an inability to control project cash flow.	0.762	
5	The interest of public buildings in the site's infrastructure and the selection of high-quality building materials reduce future maintenance costs.	0.076	
6	Rising land prices and their locations lead to poor siting of public buildings.	0.539	
7	The failure to establish private filters in front of large buildings due to the high price of land.	0.458	
8	The public buildings department seeks to uncover the causes of financial risks and tries to address that.	0.584	
9	Lack of adequate project financing results in poor site selection.	0.602	
10	Public buildings make periodic financial deposits as safety stock for any potential financial risks.	0.737	
11	Public buildings management focuses on identifying potential losses from financial risks such as currency risk and equity fluctuations.	0.694	
Cost-Effectiveness			
1	Risk analysis with its various dimensions (environmental, operational, human, financial) has no cost impact	0.277	0.678
2	Public buildings consider the cost-driving strategy when selecting a site.	0.851	
3	Public buildings seek to follow a	0.875	

	quality cost strategy when choosing a construction site.		
4	Public buildings management focuses on reducing operational costs when selecting a site.	0.713	
5	Public buildings follow a cost-to-quality strategy when selecting a site.	0.581	
Human resources			
1	There is no impact on risk analysis in its various dimensions (environmental, operational, human, financial) in human resources	0.306	0.787
2	The administration trains employees in better use of tools and software. It also provides them with technical skills to reduce potential risks.	0.737	
3	The public buildings department considers the selection of highly qualified human cadres when planning the selection of building sites.	0.817	
4	The public buildings department selects employees according to their proximity to the site.	0.637	
5	The public buildings administration provides transportation and transportation for site workers.	0.736	
6	Local authorities and ministries are endeavoring to develop a site selection policy.	0.770	
7	There is a cooperation between the working staff and the management of the public buildings when implementing the project to face potential risks.	0.714	
Competitive advantage			
1	Risk analysis with its various dimensions (environmental, operational, human, financial) has no impact on the competitive advantage	0.207	0.859
2	Public buildings have many locations that create a competitive advantage over other institutions	0.783	
3	Public buildings are interested in developing the infrastructure of the sites and working on improving roads permanently to raise their competitive advantage and develop their services and thus their revenues.	0.842	
4	Public buildings strive to pay attention to quality and innovation when	0.819	

	selecting a site	
5	Public buildings keep pace with technological and information developments to raise the efficiency of sites and improve their services.	0.766
6	When choosing a site, public buildings consider the fulfillment of the residents' desire as required.	0.766
7	Public buildings endeavor to provide private parking upon site selection	0.716

It is evident from Table (4-4) the exploratory factor analysis of the first items of the questionnaire (the engineers' questionnaire) where all the items of the dimensions of the independent and dependent variables were tested. It was found through the analysis that the sample size is sufficient and appropriate to conduct this test as the KMO test values ranged, which measures the adequacy sample size (0.678-0.859). These values indicate that the sample size is sufficient as all values are greater than the value (0.50). Therefore, it is judged that the sample size is adequate, and exploratory factor analysis can be used.

As for the factor loadings, which are the values of the item saturation of the factor, they were in the first dimension (environmental risks) ranging between (0.551-0.804) and all the values were greater than (0.30). Accordingly, they are statistically acceptable values and can be judged good validity. However, item No. (8) was excluded, as this item recorded a factor loading greater than (0.551) on another factor and therefore must be excluded. As for items of human risks dimension, the factor loadings ranged (0.163-0.793) and paragraphs No. (3) and (7) were excluded, and (11) where the values of the factor loadings for these paragraphs were less than (0.30) and thus these paragraphs are judged to be statistically invalid, while the other paragraphs were accepted where all other values were greater than (0.30). As for the (operational risks) dimension, the factor loading for the paragraphs of this dimension ranged (0.239-0.800). Paragraph (1) was excluded due to its saturation on another factor and paragraph (7) was also excluded because its load factor was less than the value (0.30), and all other paragraphs were accepted. The financial risks dimension, the factor loadings its paragraphs ranged (0.076-0.762). Paragraph No. (1) was excluded due to the saturation of the paragraph on a factor other than the financial risks dimension, and Paragraph No. (5) was also excluded due to the low value of the factor loading to less than (0.30). All other paragraphs were accepted due to the fact that the load factor is greater than the value (0.30).

As for the dimensions of the dependent variable, the values of the factor loadings for the paragraphs of the cost dimension ranged between (0.277-0.875). Paragraph No. (1) was excluded because the factor loading was less than the value (0.30). Therefore, this paragraph was not valid for statistical analysis. As for the rest of the paragraphs, it was accepted. As the factor loading reached values greater than (0.30), and the human resources dimension, the values of the factor loadings ranged for the paragraphs of this dimension (0.306-0.817). Paragraph No. (1) was excluded for its lack of statistical validity, as the paragraph saturated on another factor, and all other paragraphs were accepted. The values of the factor loadings reached values greater than the statistically acceptable value (0.30), and finally, the values of the factor loadings for paragraphs of the competitive advantage dimension were (0.207-0.842). Paragraph No. (1) was excluded due to the low value of the factor loading, as it was less than (0.30). Other paragraphs are accepted if all values were greater than (0.30).

Second: the exploratory factor analysis of the second questionnaire (population questionnaire)

Table (3-4): the construct validity of the items of the second questionnaire (population questionnaire)

No.	Item	Factor Loadings	KMO Test
1	Public buildings shall provide adequate parking for the users of this facility	0.800	
2	Public buildings when planning to choose a construction site prioritize easy accessibility to the site	0.760	**0.913**
3	Public buildings when planning the selection of a construction site prioritize easy access to the site in emergency situations.	0.825	
4	Public buildings consider when choosing a site to fulfill the residents' desire as required.	0.739	
5	When planning to construct building sites, consider keeping away from polluted places in order to preserve the safety of residents	0.766	
6	Public buildings dispose of waste and emissions in a globally recommended methodology to reduce various forms of pollution.	0.795	
7	When choosing a building site, public buildings are keen to be close to residential places	0.418	
8	The good choice of public sites plays a big role in reducing the risk of suffocating traffic crises.	0.392	
9	When choosing a site, public buildings take care to provide pedestrian paths	0.754	
10	Public buildings provide services to residents as required	0.747	

Table (3-5) refers to the exploratory factor analysis of the second paragraphs of the questionnaire (the population questionnaire), where the value of the KMO test reached (0.913). This value indicates that the sample size is sufficient and appropriate to conduct the test as the value exceeded the statistically acceptable value (0.50). As for the values of the factor loadings for the ten paragraphs of the questionnaire, all the values of the factor loadings were greater than (0.30) since the values ranged from (0.392-0.825). Therefore, all the paragraphs were judged with statistical validity, and that convergent validity was achieved in the paragraphs of the questionnaire.

Third: the stability of the study tool (reliability)

To ensure the stability of the questionnaire, the extent of internal consistency between the paragraphs of the questionnaire must be considered. The internal consistency between the paragraphs indicates the existence of stability in their answers over time, so the constant and stable test gives the same results when applying the tests to the same group again.

The internal consistency between the paragraphs of the questionnaire was confirmed by the Cronbach Alpha test, where the result is statistically acceptable. If the value of the Cronbach Alpha coefficient is greater than (0.60) according to (Sekaran and Bougie, 2016), and whenever the value of the Cronbach Alpha coefficient is closer to 1.00, that shows the questionnaire is reliable.

Table (3-5): Reliability of the questionnaire

Variable	Cronbach alpha values	Items No.
First questionnaire (Engineers questionnaire)		
Environmental risks	0.854	7
Human risks	0.831	8
Operational risks	0.820	6
Financial risks	0.828	9
Cost	0.753	4
Human resources	0.830	6
Competitive advantage	0.872	6
All items in the questionnaire	0.955	46
Second questionnaire (population questionnaire)		
Potential risks in selecting public building sites and applying criteria for determining public buildings	0.888	10

Table (3-5) refers to the Cronbach Alpha test, which measures the validity of the internal consistency and the reliability of the paragraphs of the questionnaire. It is clear from the results of the previous table that the Cronbach Alpha coefficient ranged in value in the first question (0.753-0.872) and the total stability of the Questionnaire was (0.955). The reliability of the Questionnaire is high and its results can be trusted. As for the second Questionnaire (population questionnaire), the Cronbach Alpha coefficient of the resolution reached (0.888). This value indicates high stability, high reliability, and its results can be trusted.

3.7 The demographic characteristics of the study sample

Tables (3-6) and (3-7) refer to the demographic characteristics of the study sample individuals. Table (3-7) refers to the demographic characteristics of the engineers in the sample, while Table (3-7) indicates the demographic characteristics of the sample population.

Table (3-6): Demographic characteristics of the study

Variable		Frequency	%
Age	Less than 30	51	49%
	30- Less than40	33	31.7%
	40- Less than50	13	12.5%
	50 Years and above	7	6.7%
Gender	Male	53	51%
	Female	51	49%
Education	Diploma	3	2.9%
	Bsc	82	78.8%
	Msc	18	17.3%
	P.hD	1	1%
Experience	6 Years and less	36	34.6%
	6-10 years	32	30.8%
	11-15 years	18	17.3%
	16 years and above	18	17.3%
Job title	Project manager	19	18.3%
	Site egineer	28	26.9%
	Quality engineer	6	5.1%
	Design engineer	7	6.7%
	Planning Engineer	4	3.8%
	Assistant Engineer	2	1.9%
	Manager / Head of department	8	7.7%
	Administrative officer	8	7.7%
	Other non-administrative employees	1	1%
	Total	**104**	**100%**

Table (3-7) indicates the demographic characteristics of the members of the sample population as follows:

Table (3-7): Demographic characteristics of the members

Variable		**Frequency**	**%**
Gender	Male	37	16.6%
	Female	186	83.4%
Age	Less than 30	81	36.3%
	30-39 Years	92	41.3%
	40-49 years	27	12.1%
	50 Years and above	23	10.3%
Marital status	Single	67	30%
	Married	156	70%
Job	Manager / Head of department administrative officer	21	9.4%
	Administrative employee	49	22%
	Non- administrative employee	35	15.7%
	Other	118	52.9%
Service Years	Less than 5 years	27	12.1%
	5 - 9 years	45	20.2%
	10 - 14 years	91	40.8%
	15 years and above	60	26.9%
Education	High school	19	8.5%
	Diploma	137	61.4%
	B.Sc.	46	20.6%
	Graduate studies	21	9.4%
Total		**223**	100%

Chapter Four
Results and Discussion

This chapter provides a detailed presentation of the results of the field study in terms of descriptive statistics of the variables and dimensions of the study, as well as conducting pre-tests and testing hypotheses through the SPSS program and also discussing the results that have been reached in addition to the most important recommendations.

4.1 The results of the descriptive analysis of the first questionnaire (the questionnaire that directed to engineers'):

First: The descriptive statistics of the paragraphs of the dimensions of the independent variable

1- Descriptive statistics of paragraphs of environmental risks dimension

Table (4-1): Descriptive statistics for the dimension of environmental risks

No	Items	Mean	Standard Deviation	RII	Importance level
1	Environmental risk analysis influences the criteria for identifying public buildings	4.35	0.637	0.87	H
2	Public buildings consider conditions and weather conditions when selecting building sites.	3.77	1.09	0.754	M-H
3	Public buildings take the necessary precautions to avoid the occurrence of environmental disasters such as earthquakes, floods, and fires when choosing the sites of buildings	3.80	1.08	0.76	M-H
4	Public buildings when planning to choose a construction site prioritize easy access to the site in emergencies.	3.95	0.91	0.79	M-H
5	Consider that public buildings stay away from agricultural areas and avoid harming the green environment when choosing building sites.	3.59	1.19	0.718	M-H
6	Public buildings are obligated to choose the materials used in the construction process and consider the existence of consistency between quantities, plans, specifications, and standards in order to avoid potential environmental risks when selecting public building sites.	3.54	1.00	0.708	M-H
7	Public buildings dispose of waste and emissions in a globally recommended methodology to reduce various forms of pollution.	3.30	1.15	0.66	M-H
Overall mean		**3.76**	**-**	0.752	M-H

Table (4-1) refers to the descriptive statistics of the items of environmental risks dimension, as the general average for this dimension reached (3.76) and RII (0.752) at a medium-high level, and this result indicates that the engineers who responded to the first questionnaire believe that those responsible for public buildings focus on the environmental and health aspects when planning to build these buildings. The arithmetic averages of the items of this dimension ranged (3.30-4.35). The largest item in terms of the arithmetic mean was item No. (1), which states “Environmental risk analysis influences criteria for private-public buildings”, as its arithmetic mean reached (4.35) with a standard deviation (0.637) and the level of importance High This result indicates that the respondents to the study tool of engineers agree on the importance of analyzing environmental risks and their impact on the criteria for determining public buildings, and the least arithmetic mean item was item No. (7) which states: "Public buildings dispose of waste and emissions in a globally." recommended methodology to reduce various forms of pollution, as its arithmetic mean is (3.30) with a standard deviation (1.15) and with a medium-high significance level

2. Descriptive statistics of items human risks dimension

Table (4-2): Descriptive statistics of the human risk dimension

No	Items	Mean	Standard Deviation	RII	Importance level
1	Human risk analysis influences the criteria for identifying public buildings	3.78	0.941	0.756	M-H
2	The remarkable increase in population numbers as a result of immigration from neighboring countries leads to poor selection of public building sites due to population pressure and the need to provide buildings quickly.	3.99	0.794	0.798	M-H
3	The personnel responsible for establishing public building sites shall comply with instructions and safety procedures.	3.50	1.05	0.7	M-H
4	The public buildings department undertakes a comprehensive assessment of all employees to match their skills with the work required to be constructed in order to avoid risks.	3.38	1.08	0.676	M-H
5	Public buildings encourage informal communication between employees and management to provide the best assistance to reduce risks.	3.42	1.00	0.684	M-H
6	Traffic analysis is considered when selecting sites for public buildings	3.49	1.08	0.698	M-H
7	Public buildings consider the history of previous accidents and traffic	3.32	1.13	0.664	M-H
8	The environmental risk analysis considers the Environmental Impact Assessment.	3.55	0.922	0.71	M-H
Overall mean		**3.55**	**-**	**0.71**	M-H

Table (4-2) refers to the descriptive statistics of the items of the dimension of human risks, as the general average for this dimension reached (3.55) with a high-medium degree, and this indicates that the interest of those in charge of organizing, planning and constructing public buildings focus on human risks in a moderate manner, and the arithmetic averages for this dimension ranged (3.32-3.99) and the largest item in terms of arithmetic mean was item No. (2) which states: “The remarkable increase in population numbers as a result of immigration from countries leads to poor selection of public building sites due to population pressure and the need to provide Buildings quickly, as its arithmetic mean reached (3.99) with a standard deviation (0.794) and with a high-medium level of importance. As for the item that was less in terms of the arithmetic mean, item No. (7) which states: “Public buildings take into account history of previous accidents and traffic” is the lowest. With a mean of (3.32), a standard deviation of (1.13), and a high-medium level of importance.

3. Descriptive statistics for the dimension of operational risk

Table (4-3): Descriptive statistics of the operational risk dimension

No	Items	Mean	Standard Deviation	RII	Importance level
1	Public buildings provide plans for service networks on-site (such as electricity, water, telephone, and other services) in order to maintain the progress of the work plan.	3.88	0.779	0.776	H-M
2	Public buildings maintain a consistent design and plan during project implementation in order to avoid hazards.	3.42	0.982	0.684	H-M
3	Public building sites use high-quality performance standards to check and evaluate the progress of operational processes in comparison with other projects of the institution or others.	3.43	0.952	0.686	H-M
4	The department trains employees in a better use of tools and software and also provide them with technical skills to reduce operational risks	3.53	1.00	0.706	H-M
5	Public buildings provide large locations suitable for mega projects, thus encouraging investment.	3.60	1.00	0.72	H-M
6	Public buildings follow a single design according to a tight plan to avoid potential operational hazards	3.28	0.972	0.656	H-M
Overall mean		3.52	-	0.704	H-M

Table (4-3) refers to the descriptive statistics of the items of the dimension of operational risks, where the overall average of the dimension was (3.52) with a high-medium level of importance. This result indicates that the respondents to the questionnaire from engineers perceive that the concern of those responsible for public buildings about aspects related to operational risks was the arithmetic averages of the items operational risks dimension ranged from (3.28-3.88). The item was the largest in terms of the arithmetic mean item No. (1) which states: “Public buildings provide plans for service networks on-site (such as electricity, water, telephone, and other services). In order to maintain the progress of the work plan, as its arithmetic average reached (3.88) with a standard deviation (0.779) and with a high-medium level of importance, and the item that is less in terms of the arithmetic mean is item No. (6) which states: “Public buildings follow a single design according to a tight plan to avoid potential operational hazards, as its arithmetic mean (3.28) with a standard deviation (0.972) with a high-medium significance level.

4. Descriptive statistics of the financial risk dimension

Table (4-4): Descriptive statistics of the financial risk dimension

No	Items	Mean	Standard Deviation	RII	Importance level
1	Public buildings consider implementing procedures and policies to systematically identify opportunities.	3.66	0.807	0.732	H-M
2	The variation in the economic level of the population leads to poor selection of the locations of public buildings according to the inhabited area	3.81	0.942	0.762	H-M
3	Regular site maintenance results in an inability to control project cash flow.	3.24	1.11	0.648	H-M
4	Rising land prices and their locations lead to poor siting of public buildings.	3.95	0.840	0.79	H-M
5	The failure to establish private filters in front of large buildings due to the high price of land.	3.50	1.07	0.7	H-M
6	The public buildings department seeks to uncover the causes of financial risks and tries to address that.	3.29	0.890	0.658	H-M
7	Lack of adequate project financing results in poor site selection.	3.74	0.965	0.748	H-M
8	Public buildings make periodic financial deposits as safety stock for any potential financial risks.	3.24	1.02	0.648	H-M
9	Public buildings management focuses on identifying potential losses from financial risks such as currency risk and equity fluctuations.	3.33	0.981	0.666	H-M
Overall mean		3.53	-	0.706	H-M

Table (4-4) refers to the descriptive statistics of the items of the dimension of financial risks, as the general average for this dimension was (3.53) at a high-medium level. This result indicates that respondents to the questionnaire of engineers look at the interest of those in charge of public buildings in analyzing financial risks. It was medium, where the averages ranged. The arithmetic for this dimension (3.24-3.95) and the highest item in terms of the arithmetic mean was Item No. (4), which states “Rising land prices and their locations lead to poor siting of public buildings,” as its arithmetic mean reached (3.95) with a standard deviation (0.840) and the level of the importance is high-medium and the item is the least in terms of the arithmetic mean. item No. (3) which states “Regular site maintenance results in an inability to control project cash flow” and item No. (8) which states “Public buildings make periodic financial deposits as safety stock for any potential financial risks, "as the arithmetic average of these two items reached (3.24) with a standard deviation (1.11) for the third item and (1.02) for the eighth item

Second: Descriptive statistics of the paragraphs of the dimensions of the dependent variable

1. Descriptive statistics of the cost dimension

Table (4-5): Descriptive statistics for the cost dimension

No	Items	Mean	Standard Deviation	RII	Importance level
1	Public buildings consider the cost-driving strategy when selecting a site.	3.60	0.829	0.72	H-M
2	Public buildings seek to follow a quality cost strategy when choosing a construction site.	3.61	0.851	0.722	H-M
3	Public buildings management focuses on reducing operational costs when selecting a site.	3.62	0.915	0.724	H-M
4	Public buildings follow a cost-to-quality strategy when selecting a site.	3.27	0.979	0.654	H-M
Overall mean		3.53	-	0.706	H-M

Table (4-5) refers to the descriptive statistics of the paragraphs of the cost dimension, as the general average for this dimension reached (3.53) with an average level of importance, and the arithmetic averages for the paragraphs of this dimension ranged from (3.27-3.62) and the largest paragraph in terms of the arithmetic mean was paragraph No. (3) which states “Public buildings management focuses on reducing operational costs when selecting a site,” as the arithmetic mean of this paragraph was (3.62) with a standard deviation (0.915) and a medium level of importance, while Paragraph No. (4) which states “Public buildings follow a cost-to- quality strategy when selecting a site "is the lowest in terms of the arithmetic mean, as the arithmetic mean of this paragraph was (3.27) with a standard deviation (0.979) and a medium level of importance.

2. Descriptive statistics of the human resources dimension

Table (4-6): Descriptive statistics of the human resources dimension

No	Items	Mean	Standard Deviation	RII	Importance level
1	The administration trains employees in better use of tools and software and also provide them with technical skills to reduce potential risks.	3.50	0.913	0.7	H-M
2	The public buildings department considers the selection of highly qualified human cadres when planning the selection of building sites.	3.52	0.955	0.704	H-M
3	The public buildings department selects employees according to their proximity to the site.	2.94	1.08	0.588	M
4	The public buildings administration provides transportation and transportation for site workers.	3.30	1.02	0.66	H-M
5	Local authorities and ministries are endeavoring to develop a site selection policy.	3.41	0.909	0.682	H-M
6	There is a cooperation between the working staff and the public building's management when implementing the project to face potential risks.	3.62	0.883	0.724	H-M
Overall mean		3.38	-	0.676	H-M

Table (4-6) refers to the descriptive statistics of the items of the human resources dimension, as the general average for this dimension was (3.38) at an high-medium level, and the arithmetic averages for the items of this dimension ranged (2.94-3.62) and item No. (6) was the highest in terms of the arithmetic mean, which states There is a cooperation between the work staff and the public buildings management when implementing the project to face potential risks. Its arithmetic mean is (3.62) with a standard deviation (0.883) and a high- medium level. item No. (3) which states: “The Public Buildings Department selects the employees according to their proximity to the site "are the lowest in terms of the arithmetic mean, reaching (2.94) with a standard deviation (1.08) and a medium level.

3. Descriptive statistics for paragraphs competitive advantage dimension

Table (4-7): Descriptive statistics of the competitive advantage dimension

No	Items	Mean	Standard Deviation	RII	Importance level
1	Public buildings have many locations that create a competitive advantage over other institutions	3.62	0.849	0.724	H-M
2	Public buildings are interested in developing the infrastructure of the sites and working on improving roads permanently to raise their competitive advantage and develop their services and thus their revenues.	3.55	1.07	0.71	H-M
3	Public buildings strive to pay attention to quality and innovation when selecting a site	3.44	1.01	0.688	H-M
4	Public buildings keep pace with technological and information developments to raise the efficiency of sites and improve their services.	3.64	0.869	0.728	H-M
5	When choosing a site, public buildings consider the fulfillment of the residents' desire as required.	3.29	1.06	0.658	H-M
6	Public buildings endeavor to provide private parking upon site selection	3.58	1.10	0.716	H-M
Overall mean		3.52	-	0.704	H-M

Table (4-7) refers to the descriptive statistics of the items of the competitive advantage dimension, as the general average for this dimension reached (3.52) at an High-medium level, and the arithmetic averages ranged from (3.29-3.64), and the largest item in terms of the arithmetic mean was item No. (4) which states “Public buildings Keep pace with technological and information developments to raise the efficiency of sites and improve their services, as its arithmetic average reached (3.64) with a standard deviation (0.869) and the level of high-medium importance, and the item was the lowest in terms of the arithmetic mean item No. (5) which states “When choosing a site, public buildings take into account the fulfillment of the residents' desire as required ", as their arithmetic mean is (3.29) with a standard deviation (1.06) and a high-medium level.

4.2 Descriptive statistics of the second questionnaire (Population survey)

Table (4-8): Descriptive statistics of the population questionnaire

No	Items	Mean	Standard Deviation	RII	Importance level
1	Public buildings shall provide adequate parking for the users of this facility	3.40	1.31	0.68	H-M
2	Public buildings when planning to choose a construction site prioritize easy accessibility to the site	3.67	0.989	0.734	H-M
3	Public buildings when planning the selection of a construction site prioritize easy access to the site in emergency situations.	3.64	1.13	0.728	H-M
4	Public buildings consider when choosing a site to fulfill the residents' desire as required.	3.47	1.04	0.694	H-M
5	When planning to construct building sites, consider keeping away from polluted places in order to preserve the safety of residents	3.63	1.15	0.726	H-M
6	Public buildings dispose of waste and emissions in a globally recommended methodology to reduce various forms of pollution.	3.51	1.18	0.702	H-M
7	When choosing a building site, public buildings are keen to be close to residential places	3.41	1.03	0.682	H-M
8	The good choice of public sites plays a big role in reducing the risk of suffocating traffic crises.	4.14	0.971	0.828	High
9	When choosing a site, public buildings take care to provide pedestrian paths	3.70	1.06	0.74	H-M
10	Public buildings provide services to residents as required	3.45	1.02	0.69	H-M
Overall mean		**3.60**	**-**	0.72	H-M

The descriptive statistics of the second items of the questionnaire (the population questionnaire) are shown in Table (4-8), where the general average of these items was (3.60) with a high-medium level of importance, and the items of this questionnaire ranged from (3.40-4.14) and the largest item in terms of the arithmetic mean was item No. (8)) Which states, "The good choice of public sites plays a big role in reducing the risk of suffocating traffic crises." As its arithmetic average reached (4.14) with a standard deviation (0.971) and a high level of importance, and this result indicates that respondents to the questionnaire from the population are considered one of the most important factors that must be studied when planning the construction of public buildings to be taken into account to reduce traffic crises, while the item was the least in terms of the arithmetic mean Item No. (1), which states “Public buildings shall provide adequate parking for the users of this facility”, was the lowest in terms of the arithmetic mean, as its arithmetic mean (3.40) with a standard deviation (1.31) and a high-medium importance level.

Looking at the responses of the respondents to the second questionnaire intended for the population, it becomes clear that the residents believe that the most important factor that must be studied by officials is the risk of traffic crises, as traffic crises lead to wasting the time of auditors and visitors to these buildings and thus, according to the respondents ’answers, officials must study the factors that lead to the crises Traffic.

4.3 Testing the hypotheses of the study

Before testing the study hypotheses, the researchers made sure that the assumptions of the simple and multiple linear regression test were fulfilled in the study data and its variables, where the researchers conducted a normal distribution test and tested the variance inflation factor and made sure of the relationships between the variables as explained in the following tables and paragraphs:

First, the normal distribution test

One of the basic conditions that must be ascertained before starting to test the hypotheses of the study is to ensure that the study data follow the normal distribution, and this was confirmed by testing the kurtosis and kurtosis coefficient, where the absolute skewness coefficient value must be less than (1), even if it is greater than this number. The data are considered crooked according to the kurtosis coefficient sign, and therefore it is not distributed normally, and also the value of the absolute kurtosis coefficient must be less than (3) since if the value of this parameter exceeds more than (3), then the distribution of the data is abnormal and Table (4-8) illustrates Results of the two tests.

Table (4-9): The normal distribution test

Variable	Skewness values	Kurtosis values
Environmental risks	-0.302	-0.777
Human risks	-0.030	-0.697
Operational risks	-0.314	-0.118
Financial risks	-0.043	-0.299
Cost	-0.452	0.170
Human resources	-0.310	0.237
Competitive advantage	-0.701	-0.066

It is evident through the results presented in Table (4-9) the normal distribution test for the independent and dependent study variables where all the absolute values of the skewness coefficient were less than (1) and all the values of the absolute kurtosis coefficient were less than (3). This indicates that the data are normally distributed. Conducting parametric (parameter) tests, which include the linear regression test, which is used to test the study hypotheses.

Second: The test of common linear multicollinearity

One of the assumptions for the multiple linear regression test is the absence of the independent variables from large correlations between them, as the large correlations lead to a bias in the estimation of the parameters. This also leads to problems in the regression model or the so-called pseudo-regression problem. Therefore, making sure that the independent variables are free of large correlations (The absence of a common linear multiplicity problem)it is necessary to be sure before testing the hypotheses, and therefore the researchers conducted a test of the Variance Inflation Factor VIF, where the value of this parameter should not exceed (10) and the Tolerance value must be greater than) 0.10) according to (Sekaran and Bougie, 2016) and Table (4-10) shows the results of this test.

Table (4-10): Test of amplification of VIF

Independent Variable	VIF	Tolerance
Environmental risks	1.987	0.503
Human risks	2.763	0.362
Operational risks	2.434	0.411
Financial risks	2.824	0.548

Through the results presented in Table (4-10), it becomes clear that the VIF coefficient is tested to reveal the problem of High correlation between the independent variables in the regression model. All values are less than (10) and that the tolerance values ranged from (0.362-0.548), meaning that all values are greater than (0.10). Therefore, it can be judged that there is no common linear multiplicity problem among the independent variables in this study. Multiple linear regression tests can be performed with certainty of the absence of pseudo-regression problems in the study model.

Third: a matrix of correlations between study variables

The correlation matrix is one of the most common tests used to ensure the correlation between two variables with each other and the significance of this correlation statistically. Therefore, the researchers made sure of the correlation between the variables through Pearson values, which is considered a parametric test that requires the normal distribution of the data and the table (4- 11) Explain the results of correlations between variables.

Table (4-11): Matrix of correlations between study variables

	ER	HRS	OR	FR	Cost	HR	CA
ER	1						
HRS	0.671**	1					
OR	0.575**	0.698**	1				
FR	0.315**	0.577**	0.620**	1			
Cost	0.347**	0.558**	0.552**	0.597**	1		
HR	0.568**	0.615**	0.662**	0.497**	0.640**	1	
CA	0.509**	0.735**	0.678**	0.531**	0.659**	0.792**	1

ER: Environmental Risks **HR: Human Recourses**
HRS: Human Resource Risks **CA: Competitive Advantage**
OR: Operational Risks
FR: Financial and business Risks

**** Significance at 0.01, * Significance at 0.05**

It is evident from Table (4-11) the matrix of inter-correlations between the study variables, where the values of the correlation coefficients ranged between the study variables (0.315-0.792) and that all of these values were significant at the level of statistical significance at (0.01). Therefore, all of these relationships are statistically significant. The highest correlation value was (0.792) between the two variables, human resources, and competitive advantage, and the lowest correlation value was (0.315) between the two variables, environmental risks, and financial risks. As for the correlations between the independent variables, it becomes clear that all correlation values are less than (0.90), and this confirms the previous result. Which was extracted in the test of VIF, which confirms that the independent variables do not have a common linear multiplicity problem.

Fourth: Testing the hypotheses of the study

The researchers tested the study hypotheses through the simple and multiple linear regression test, where the main hypothesis was tested using simple linear regression where the independent variable included the general average of all dimensions of the independent variable, and then a multiple linear regression test was performed for each dimension of the independent variable on the dependent variable.

Main hypothesis $H_{\circ}$: There is no statistically significant impact at (0.05 α) level for risk analysis with its combined dimensions (environmental risks, human risks, operational risks, financial risks) in the criteria for determining public buildings with their dimensions (cost, human resources, competitive advantage), and it emerges from this hypothesis the following sub-hypotheses:

To test the hypothesis of the main study, the researchers performed a simple linear regression test, as shown in Table (4-12).

Table (4-12): Results of the first main study hypothesis test

Variable	R	R2	F Value	Sig	B	Std.Error	T- Calculated	Sig
Constant	0.773	0.597	151.041	0.000	0.320	0.260	1.228	0.222
Risk analysis					0.879	0.072	12.290	0.000

It is evident through the results presented in Table (4-12) the simple linear regression test to test the hypothesis of the first main study, as it is evident through the values in the previous table that the value of the correlation coefficient R has reached (0.773) and this value indicates that there is a strong relationship between the independent variable. And the dependent variable and the value of the determination coefficient R^2 was (0.597) and this value indicates that the amount of (59.7%) of the change in the dependent variable was caused by the independent variable, and the value of F was (151.041) and the probability value was (0.000), meaning that this value is less From the significance level at (0.05) and this indicates the significance and significance of the regression model, and the value of the regression coefficient (beta) was (0.879) and this value indicates that the effect is positive and strong, as the calculated t value was (12.290) and the probability value was (0.000), The decision rule for this test states, “If the calculated t value is greater than 1.96 and the probability value is smaller than the level of statistical significance 0.05, then the researchers must reject the null hypothesis and accept the alternative hypothesis, and if the calculated t value is smaller than the tabular t value and the probability value is greater than 0.05 The researchers must accept the null hypothesis "and when looking at the calculated t value, it becomes clear that it is greater than the tabular value and the probability value (0.000) is less than the significance level at (0.05). Therefore, the decision is to reject the null hypothesis and accept the alternative hypothesis that there is a statistically significant effect for risk analysis with its combined dimensions (environmental risks, human risks, operational risks, financial risks) in the criteria for determining public buildings with their dimensions (cost, human resources, competitive advantage)

Hypothesis testing of the sub-study:

H01: There is no statistically significant impact at the level (0.05 ≥ α) for risk analysis with its combined dimensions (environmental risks, human risks, operational risks, financial risks) on cost

Table (4-13): Results of the first sub-study hypothesis

Variable	R	R2	F Value	Sig	B	Std. Error	T- Calculated	Sig
Constant					0.794	0.342	2.323	0.022
Environmental risks					-0.034	0.096	-0.351	0.727
Human risks					0.256	0.125	2.049	0.043
Operational risks	0.661	0.437	19.224	0.000	0.174	0.115	1.508	0.135
Financial risks					0.380	0.110	3.439	0.001

Table (4-13) refers to the multiple linear regression test to test the hypothesis of the first sub-study, where the results in Table (4-12) indicate that the value of the correlation R is (0.661) and the value of the coefficient of determination R^2 is (0.437) and this value indicates that A percentage (43.7%) of the change in the dependent variable cost is caused by the independent variables combined, and the calculated value of F was (19.224) and the probability value was (0.000), meaning that this value is less than (0.05). This result indicates that the regression model is statistically significant. To know the effect of each independent variable on the dependent variable, the results were as follows:

1. The value of the regression coefficient (beta) for the environmental risk variable was (-0.034). This value indicates that the impact of environmental risks on the cost was weak and negative, and the calculated t value was (-0.351) and the probability value was (0.727), meaning that the probability value is greater than the level of the statistical significance is at (0.05). Therefore, the decision is to accept the null hypothesis that there is no statistically significant impact of environmental risks on the cost.
2. The value of the regression coefficient (beta) for the independent variable, the human risk, was (0.256). This value indicates that the effect of the human risk variable on the cost was positive and the average strength. The calculated t value was (2.049) and the probability value was (0.043), meaning that this value is smaller than the level of statistical significance is at the level of (0.05). Therefore, the decision is to reject the null hypothesis and accept the alternative hypothesis that there is a statistically significant impact on human risk on cost.
3. The value of the regression coefficient (beta) for the independent variable was the operational risk (0.174) and this value indicates that the effect is positive and the calculated t value was (1.508) and the probability value was (0.135), meaning that it is greater than the level of significance at the level of (0.05). The null hypothesis that there is no statistically significant impact of operational risk on cost.
4. The value of the regression coefficient (beta) for the independent variable financial risk (0.380) and this value indicates that the effect of financial risk on the cost was strong and positive, and the calculated t value was (3.439) and the probability value was (0.001), i.e. it is less than the level of statistical significance. At the level of (0.05), therefore, the decision is to reject the null hypothesis and accept the alternative hypothesis that there is a statistically significant effect of financial risk on cost.

H02: There is no statistically significant impact at (0.05 ≥ α) for risk analysis in its combined dimensions (environmental risks, human risks, operational risks, financial risks) on human resources.

Table (4-14): Results of the second sub-study hypothesis

Variable	R	R2	F Value	Sig	B	Std. Error	T- Calculated	Sig
Constant	0.717	0.513	26.118	0.000	0.269	0.332	0.811	0.419
Environmental risks					0.217	0.093	2.322	0.022
Human risks					0.148	0.121	1.222	0.225
Operational risks					0.364	0.112	3.242	0.002
Financial risks					0.139	0.107	1.296	0.198

Table (4-14) refers to multiple linear regression analysis to test the hypothesis of the second sub-study, where the value of the correlation coefficient R of (0.717) indicates the existence of a medium-strength relationship between the independent variables and the dependent variable, and the value of the coefficient of determination R^2 (0.513), meaning that (51.3%) The value of the From the variation in the dependent variable human resources caused by the independent variables combined, calculated F was (26.118) and its probability value was (0.000), and this value indicates that the regression model is statistically significant, and the results of the effect of the independent variables on the dependent variable are as follows:

1. The value of the regression coefficient (beta) for the environmental risk variable was (0.217). This value indicates the existence of a positive impact of the environmental risk analysis on human resources. The calculated t value was (2.322) and the probability value for it was (0.022), meaning that the probability value is smaller than the level of significance. Statistically at the level of (0.05). Therefore, the researchers rejected the null hypothesis and accepted the alternative hypothesis that there is a statistically significant impact of environmental risks on human resources.
2. The value of the regression coefficient (beta) for the independent variable, human risk (0.148), indicates that the effect of human risk on human resources was positive, and the calculated t value was (1.222) and the probability value was (0.225), meaning that the probability value is greater than the level of significance. Statistically at (0.05), this means accepting the null hypothesis that there is no statistically significant impact of human risks on human resources.
3. The value of the regression coefficient (beta) for the independent variable, the operational risk (0.364), indicates that the impact of operational risks on human resources was positive, and the calculated t value was (3.242) and the probability value was (0.002), meaning that the probability value is smaller than the level of Statistical significance at the level of (0.05), which means rejecting the null hypothesis and accepting

the alternative hypothesis that there is a statistically significant impact of operational risks on human resources.

4. The value of the regression coefficient (beta) for the independent variable financial risk (0.139) and this value indicates that the effect of the independent variable financial risk on the dependent variable human resources was positive and the value of t was calculated (1.296) and the probability value was (0.198) meaning that this value Greater than the level of statistical significance at (0.05). This indicates the acceptance of the null hypothesis that there is no statistically significant effect of financial risks on human resources.

H03: There is no statistically significant impact at (0.05 α α) level for risk analysis with its combined dimensions (environmental risks, human risks, operational risks, financial risks) on the competitive advantage

Table (4-15): Results of the third sub-study hypothesis

Variable	R	R2	F Value	Sig	B	Std. Error	T- Calculated	Sig
Constant	0.772	0.596	36.459	0.000	0.093	0.333	0.278	0.782
Environmental risks					-0.022	0.094	-0.234	0.815
Human risks					0.577	0.122	4.744	0.000
Operational risks					0.341	0.113	3.028	0.003
Financial risks					0.074	0.108	0.685	0.459

Table (4-15) refers to the multiple linear regression analysis tests to test the hypothesis of the third sub-study, where the value of the correlation coefficient R was (0.772) and the value of the coefficient of determination R^2 was (0.596) and this value indicates that an amount of (59.6%) of the change in the competitive advantage is caused by the independent variables combined, and the calculated value of F was (36.459) and its probability value was (0.000). This result indicates that the regression model was statistically significant, and as for the effect of the independent variables on the dependent variable, the results were as follows:

1. The value of the regression coefficient (beta) for the independent variable, the environmental risk, was (-0.022). This value indicates that the effect of environmental risks on the competitive advantage was weak and negative, and the calculated t value was (-0.234) and the probability value was (0.815), meaning that it is Greater than the significance level at (0.05). Therefore, the null hypothesis was accepted that there is no statistically significant effect of environmental risks on competitive advantage.
2. The value of the regression coefficient (beta) for the independent variable, human risk (0.577), indicates that the effect of human risk on competitive advantage was positive, and the calculated t value was (4.744) and the probability value was (0.000). This result indicates the rejection of the null hypothesis and acceptance the alternative hypothesis is that there is a statistically significant impact of human risk on competitive advantage.

3. The value of the regression coefficient (beta) for the independent variable is the operational risk (0.341). This value indicates that the effect of operational risk on the competitive advantage was positive. The calculated t value was (3.028) and its probability value was (0.003). Therefore, the null hypothesis was rejected and accepted. The alternative hypothesis is that there is a statistically significant impact of operational risk on competitive advantage.
4. The value of the regression coefficient (beta) for the independent variable financial risk (0.074) and this value indicates that the effect of financial risk on the competitive advantage was weak and positive, and the calculated t value was (0.685) and the probability value was (0.495) and therefore the null hypothesis was accepted. There is no statistically significant impact of financial risks on competitive advantage.

4.4 Discussion of the results

The study reached many results:

First: test the hypothesis of the main study

The results of the main study confirmed the existence of a statistically significant impact of risk analysis in all dimensions (environmental risks, human risks, operational risks, financial risks) on the criteria for identifying public buildings in all dimensions (cost, human resources, competitive advantage), where the value of R2 was (0.597), this value indicates that risk analysis in all its dimensions affects by (59.7%) the dependent variable, and the researchers attributed this effect to the fact that the engineers who perform the risk analysis which can define public buildings locations with more accurate criteria and therefore assessing these risks will lead to improving the criteria for identifying public buildings.

Second: Testing the hypothesis of the first sub-study

The results of the study indicated that there is a statistically significant effect of risk analysis on cost, as the value of the determination coefficient R2 was (0.437), meaning that the risk analysis affects the cost by (43.7%). The potential risk leads to reducing the costs that may be incurred due to delays or financial problems that may arise from the construction. The environmental and operational risks had no impact on the cost.

Third: the tests of the hypothesis of the second study

The res1ults of the study confirmed the existence of a statistically significant impact of risk analysis on human resources, as the value of the coefficient of determination R2 (0.513) indicates that (51.3%) of the impact on human resources is caused by risk analysis, and both environmental and operational risks had an impact on human resources, the analysis of human and financial risks had no impact on human resources.

Fourth: testing the hypothesis of the third study

The results of the study showed that there is a statistically significant impact of risk analysis on the competitive advantage, and the value of the coefficient of determination R2 (0.596) indicates that (59.6%) of the change in the dependent variable is caused by the risk analysis, and both human and operational risks had an impact on the advantage. Competitiveness while the financial and human risks did not affect the competitive advantage, the researchers attributed this result to the fact that improving productivity by reducing operational risks and paying attention to the human element would lead to a reduction in human risks and thus increase the competitive advantage in these projects.

4.5 Recommendations and Future Work

Based on the results of the study, the researchers developed the following recommendations:

1. Recommending that many other potential risks should be studied that may affect the criteria for determining public buildings.
2. The necessity of training the engineers in charge of constructing and building public buildings to analyze potential risks in the process of planning and implementing public buildings.
3. Focusing on implementing international protocols concerning environmental aspects when implementing projects related to public buildings to reduce the level of environmental risks in public buildings.
4. The necessity to involve the local community in identifying the problems that may face workers and those responsible for these buildings before starting their implementation.
5. Recommending the necessity of conducting comparative studies between public buildings (such as schools and hospitals) and comparing them with other public buildings.
6. The need for decision-makers to develop a unified protocol for all public buildings in Jordan in the process of identifying potential risks.
7. A decision must be taken that no government building will be constructed without its presence of TIA and EIA.
8. Checking the construction of car parks and places of a pedestrian crossing, continuity of sidewalks, and clearance of obstacles.

In the future, it is possible to use dynamic planning to locate the construction site of public buildings or to use a tool to assist the decision-maker in choosing the appropriate site for the construction of public buildings.

4.6 Conclusion

Site selection plays an important role and has a major effect on the design of public buildings. A site's relationship with its setting greatly affects the decisions of architects and engineers. TIA and EIA have been recognized as an integral and obligatory part of environmental protection assessment in developed countries. However, in developing countries, TIA has only gained importance in the last decade, driven by the need to develop sustainable solutions to the congestion problem. Unfortunately, TIA and EIA don't use in Jordan, and there are rules for traffic and environmental studies for selecting public buildings locations.

This study identified the impact of risk analysis on the criteria for identifying public buildings, where the study reached many results, the most important of which is the existence of a statistically significant impact of risk analysis on the process of determining standards for public buildings. Also, the evident from the main result that the analysis of potential risks plays a fundamental role in the criteria for determining Public buildings and thus this process of analysis and planning will play a useful role in improving planning for the construction of public buildings, and thus decision-makers can benefit from this study and its recommendations to achieve the greatest possible practical and scientific benefit for engineers and researchers in this field.

A proposed guide for a public building location selection was created as (Figure 5-1) shown.

Figure 5-1: A proposed guide for a public building location selection

Based on the results obtained through the results of statistical analysis, the researchers have put forward several proposals for decision makers:

1. The study suggests for decision-makers to focus on expanding the allocation of places to park cars, as the population increase should lead to the new expansion.

2. The study suggests to decision-makers that they should pay attention when constructing a new public building near places specializing in public safety, such as police stations, fire extinguishing and ambulance services, to help the residents near these places that are characterized by the presence of large human gatherings.
3. The study suggests to decision-makers that when planning to construct a new public building, attention should be paid to keeping away from noise places such as shops, traffic movements and traffic crises.
4. The study suggests to decision-makers to pay attention to the infrastructure devoted to sanitation, as the building must be well designed to rid this building of sewage waste in a high efficiency and effectiveness.
5. The study suggests to decision makers that the building should be close to the main transportation routes to allow different means of transportation to reach this building easily and easily, and that there are places and special pedestrian streets in the building
6. The study suggests to decision-makers that sustainability is taken into consideration when planning to build a public building, as the building must have renewable energy systems, smart and environmentally friendly systems.
7. The study proposes to decision makers to provide continuous assessment studies to assess the environmental impact of the new building and the potential presence of environmental risks from the place of its construction.

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Appendixes
Appendix I
Civil engineering survey

كلية الدراسات العليا

الاستبانة

عزيزي المشارك،

تحية طيبة وبعد,,

تقوم الباحثة بدراسة بعنوان " Risk Analysis in The Criteria of Locating Public Building ". وذلك استكمالاً لمتطلبات الحصول على درجة الماجستير. وقد تم إعداد هذا الاستقصاء لتحليل أثر مخاطر مشروع البناء على معايير تحديد مواقع المباني العامة

علماً أن الإجابة على فقراتها ستكون وفقاً لمقياس ليكرت الخماسي على النحو التالي:

تتوافر بدرجة				
موافق بشدة	**موافق**	**محايد**	**غير موافق**	**غير موافق بشدة**
5	4	3	2	1

ونظراً لما عرف فيكم من معرفة ودراية في هذا المجال، أضع بين أيديكم الاستبانة المرفقة، راجية التفضل منكم بإبداء رأيكم في فقراتها, ومدى ملائمة الفقرات للمجال، وإذا كانت الفقرات صالحة، أو غير صالحة، أو بحاجة لتعديل وما هو، والتعديل المقترح، علماً بأن الاستجابة على الفقرات ستكون بدرجة (موافق بشدة، موافق، محايد، غير موافق، غير موافق بشدة).

شاكراً تعاونكم وجهودكم المبذولة وجزاكم الله خيراً

الباحثة: عنان الطراونة

اسم المشرف: أ.د. عمر المعايطة

أولًا: المعلومات الديموغرافية:

1. **العمر**

أقل من 31 ○ 31 – أقل من 40 سنة ○

40- أقل من 50 سنة ○ 50 سنة فأكثر ○

2. **الجنس**

ذكر ○ أنثى ○

3. **المؤهل العلمي**

دبلوم ○ بكالوريوس ○ ماجستير ○ دكتوراة ○

4. **سنوات الخبرة**

6 سنوات فأقل ○ 6- 10 سنوات ○ 11-15 سنة ○ 16 سنة فأكثر ○

5. **المسمى الوظيفي**

مدير مشروع ○ مهندس موقع ○ مهندس جودة ○ مهندس تصميم ○

مهندس تخطيط ○ مهندس مساعد ○ مدير / رئيس قسم ○ موظف إداري ○

موظف غير إداري ○ أخرى تذكر (   )

<table dir="rtl">
<tr><th>الرقم</th><th>الفقرات</th><th colspan="5">درجة الاجابة</th></tr>
<tr><td colspan="7">أولا: ما مستوى المخاطر المحتملة في اختيار مواقع المباني العامة</td></tr>
<tr><td colspan="2">1- المخاطر البيئية: وهي المخاطر التي تحدث نتيجة عدم اتباع اللوائح البيبئة العالمية.</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td>.1</td><td>يؤثر تحليل المخاطر البيئية في معايير تحديد المباني العامة</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>.2</td><td>تأخذ المباني العامة بعين الاعتبار الظروف والأحوال الجوية عند اختيار مواقع الأبنية.</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>.3</td><td>تأخذ المباني العامة احتياطاتها اللازمة تفاديا لوقوع مخاطر الكوارث البيئية كالزلازل والفيضانات والحرائق عند اختيار مواقع الأبنية.</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>.4</td><td>تضع المباني العامة عند التخطيط لاختيار موقع البناء أولوية سهولة الوصول بسهولة إلى الموقع في حالات الطوارئ.</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>.5</td><td>تراعي المباني العامة الابتعاد عن المناطق الزراعية وتجنب الحاق الضرر بالبيئة الخضراء عند اختيار مواقع الأبنية.</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>.6</td><td>تلتزم المباني العامة باختيار المواد المستخدمة في عملية البناء وتراعي وجود توافق بين الكميات والمخططات والمواصفات والمقاييس تجنبا للمخاطر البيئية المحتملة عند اختيار مواقع الأبنية العامة.</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="2">المخاطر البيئية: وهي المخاطر التي تحدث نتيجة عدم اتباع اللوائح البيبئة العالمية.</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td>.1</td><td>تتخلص المباني العامة من النفايات والانبعاثات بطرق منهجية موصى عليها عالميا للتخفيف من أشكال التلوث المختلفة.</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>.2</td><td>توفر المباني العامة الملابس والادوات المناسبة للتعامل مع أي مادة مضرة بيئيا.</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="2">المخاطر البشرية: وهي المخاطر المتعلقة بالعنصر البشري والتي تحدث في بيئة العمل وقد تتسبب بكوارث ومخاطر لا يحمد عقباها.</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td>.1</td><td>يؤثر تحليل المخاطر البشرية في معايير تحديد المباني العامة</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>.2</td><td>يؤدي الارتفاع الملحوظ لأعداد السكان نتيجة الهجرات من البلدان المجاورة إلى سوء اختيار مواقع الأبنية العامة نتيجة الضغط السكاني والحاجة إلى توفير المباني بصورة سريعة.</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>.3</td><td>تذبذب معدلات الانتاجية للآليات والأيدي العاملة.</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>.4</td><td>يلتزم الكادر المسئول عن إنشاء مواقع الأبنية العامة بالتعليمات وإجراءات السلامة .</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>.5</td><td>تقوم ادارة المباني العامة بتقييم شامل لجميع العاملين لموائمة مهاراتهم مع العمل المطلوب انشاؤه تجنبا لوقوع</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

	المخاطر.					
.6	تشجع المباني العامة التواصل الغير رسمي بين العاملين والادارة لتقديم افضل مساعدة لتقليل المخاطر.					
المخاطر البشرية: وهي المخاطر المتعلقة بالعنصر البشري والتي تحدث في بيئة العمل وقد تتسبب بكوارث ومخاطر لا يحمد عقباها.		**5**	**4**	**3**	**2**	**1**
.1	يلعب حسن اختيار الموقع دورا كبيرا في الحد من مخاطر الأزمات المرورية الخانقة.					
.2	يؤخذ التحليل المروري بعين الاعتبار عند اختيار مواقع الأبنية العامة					
.3	تأخذ المباني العامة بعين الاعتبار تاريخ الحوادث السابقة والحركة المرورية					
.4	يأخذ التحليل البيئي للمخاطر بعين الاعتبار تقييم الأثر البيئي (Environmental Impact Assessment)					
.5	يحد حسن اختيار الموقع من مخاطر الأزمات المرورية الخانقة					
المخاطر التشغيلية: وهي المخاطر الناجمة عن الخطط التنظيمية لسير تنفيذ المشروع		**5**	**4**	**3**	**2**	**1**
.1	يؤثر تحليل المخاطر التشغيلية في معايير تحديد المباني العامة					
.2	تقوم المباني العامة بتزويد مخططات للشبكات الخدمية في الموقع (كالكهرباء والماء والهاتف وغيرها من خدمات) حفاظا على سير خطة العمل.					
.3	تحافظ المباني العامة على اتباع تصميم واحد وخطة محكمة أثناء تنفيذ المشروع تفاديا لوقوع الأخطار.					
المخاطر التشغيلية (Operational Risks): وهي المخاطر الناجمة عن الخطط التنظيمية لسير تنفيذ المشروع		**5**	**4**	**3**	**2**	**1**
.1	تستخدم مواقع المباني العامة معايير اداء عالية الجودة لفحص وتقييم سير العمليات التشغيلية مقارنة مع المشاريع الاخرى الخاصة بالمؤسسة او غيرها.					
.2	تقوم الادارة بتدريب العاملين على استخدام أفضل على الادوات والبرمجيات وأيضا تزويدهم بمهارات تقنية لتقليل المخاطر التشغيلية					
.3	توفر المباني العامة مواقعا كبيرة ملائمة للمشروعات الضخمة وبالتالي تشجيع الاستثمار.					
.4	تؤدي صعوبة الحصول على تراخيص وتصاريح العمل إلى زيادة الأخطار التشغيلية للموقع					
.5	تتبع المباني العامة تصميما واحدا وفق خطة محكمة تفاديا لوقوع الاخطار التشغيلية المحتملة					
المخاطر المالية (Financial and business Risks**): وهي مخاطر السوق ومخاطر الائتمان.**		**5**	**4**	**3**	**2**	**1**
.1	يؤثر تحليل المخاطر المالية في معايير تحديد المباني العامة					
.2	تأخذ المباني العامة بعين الاعتبار التطبيق لاجراءات والسياسات لتحديد الفرص بشكل منهجي.					
.3	يؤدي تباين المستوى الاقتصادي للسكان إلى سوء اختيار مواقع الأبنية العامة حسب المنطقة المأهولة.					

4.	تؤدي الصيانات الدورية للموقع إلى عدم القدرة على التحكم بالتدفق النقدي للمشروع.					
	المخاطر المالية (Financial and business Risks **): وهي مخاطر السوق ومخاطر الائتمان.**	**5**	**4**	**3**	**2**	**1**
1.	اهتمام المباني العامة بالبنية التحتية للموقع واختيار مواد للبناء ذات الجودة العالية تخفف كلف الصيانة المستقبلية.					
2.	يؤدي ارتفاع أسعار الأراضي ومواقعها إلى سوء اختيار مواقع المباني العامة.					
3.	عدم إقامة مصفات خاصة أمام المباني الكبيرة يعود لارتفاع أسعار الأراضي.					
4.	تسعى إدارة المباني العامة إلى الكشف عن مسببات المخاطر المالية وتحاول معالجة ذلك.					
5.	يؤدي عدم وجود تمويل كاف للمشروع إلى سوء اختيار الموقع .					
6.	تقوم المباني العامة بإيداعات مالية دورية كمخزون أمان لأي مخاطر مالية محتملة.					
7.	تركز إدارة المباني العامة على تحديد الخسائر المحتملة من المخاطر المالية كمخاطر تحويل العملة وتقلبات الاسهم.					
	ثانيا: ما مستوى تطبيق معايير تحديد المباني العامة					
	1. التكلفة (Cost-Effectiveness)	**5**	**4**	**3**	**2**	**1**
1.	لا يوجد أثر على تحليل المخاطر بأبعاده المختلفة (البيئية، التشغيلية، البشرية، المالية) في التكلفة					
2.	تأخذ المباني العامة بعين الاعتبار استراتيجية قيادة الكلفة عند اختيار الموقع.					
	التكلفة (Cost-Effectiveness)	**5**	**4**	**3**	**2**	**1**
1.	تسعى المباني العامة إلى اتباع استراتيجية الكلفة الجودة عند اخيار موقع البناء.					
2.	تركز ادارة المباني العامة على خفض التكاليف التشغيلية عند اختيار الموقع.					
3.	تقوم المباني العامة باتباع استراتيجية الكلفة مقابل الجودة عند اخيار الموقع.					
	الموارد البشرية (Human Resources)	**5**	**4**	**3**	**2**	**1**
1.	لا يوجد أثر على تحليل المخاطر بأبعاده المختلفة (البيئية، التشغيلية، البشرية، المالية) في الموارد البشرية					
2.	تقوم الادارة بتدريب العاملين على استخدام أفضل على الادوات والبرمجيات وأيضا تزويدهم بمهارات تقنية لتقليل المخاطر المحتملة.					
3.	تراعي إدارة المباني العامة اختيار الكوادر البشرية ذات الكفاءة العالية عند التخطيط لاختيار مواقع الأبنية.					
4.	تقوم إدارة المباني العامة باختيار العاملين وفقا لقربهم من مكان الموقع.					
5.	توفر إدارة المباني العامة المواصلات والنقل للعاملين في الموقع.					
6.	تسعى السلطات والوزارات المحلية إلى تطوير سياسة اختيار الموقع.					
7.	يوجد تعاون بين كادر العمل وإدارة المباني العامة عند					

	تنفيذ المشروع لمواجهة المخاطر المحتملة.					
	الميزة التنافسية (Competitive advantage) وهي مجموعة من المهارات والموارد والخدمات التي تقدمها المباني العامة بما فيها المؤسسات التعليمية والصحية والوزارات والحكومات لعامة الناس وتميزها عن غيرها من المنافسين وقدرتها على صياغة وتطبيق الاستراتيجيات بحيث تتمتع بأعلى معايير الجودة والأداء الأمر الذي يجعلها في مركز أفضل بالنسبة لمنافسيها.	**5**	**4**	**3**	**2**	**1**
.1	لا يوجد أثر على تحليل المخاطر بأبعاده المختلفة (البيئية، التشغيلية، البشرية، المالية) في الميزة التنافسية					
.2	تمتلك المباني العامة العديد من المواقع التي تخلق لها ميزة تنافسية عن بقية المؤسسات					
.3	تهتم المباني العامة بتطوير البنية التحتية للمواقع وتعمل على تحسين الطرق بصورة دائمة لرفع ميزتها التنافسية وتطوير خدماتها وبالتالي ايراداتها.					
.4	تسعى المباني العامة الى الاهتمام بالجودة والابتكار عند اختيار الموقع					
.5	تواكب المباني العامة التطورات التكنولوجية والمعلوماتية لرفع كفاءة المواقع وتحسين خدماتها.					
.6	تأخذ المباني العامة بعين الاعتبار عند اختيار الموقع تحقيق رغبة السكان بالشكل المطلوب.					
.7	تسعى المباني العامة إلى توفير مواقف خاصة للسيارات عند اختيار الموقع					

انتهت الأسئلة

Appendix II
Public People survey

الاستبانة

الدكتور...المحترم

السلام عليكم ورحمة الله وبركاته، وبعد:

تقوم الباحثة بدراسة بعنوان " أثر تحليل المخاطر على معايير تحديد المباني العامة ". وذلك استكمالاً لمتطلبات الحصول على درجة الماجستير.

علماً أن الإجابة على فقراتها ستكون وفقاً لمقياس ليكرت الخماسي على النحو التالي:

تتوافر بدرجة				
موافق بشدة	**موافق**	**محايد**	**غير موافق**	**غير موافق بشدة**
5	4	3	2	1

ونظراً لما عرف فيكم من معرفة ودراية في هذا المجال، أضع بين أيديكم الاستبانة المرفقة، راجية التفضل منكم بإبداء رأيكم في فقراتها, ومدى ملائمة الفقرات للمجال، وإذا كانت الفقرات صالحة، أو غير صالحة، أو بحاجة لتعديل وما هو، والتعديل المقترح، علماً بأن الاستجابة على الفقرات ستكون بدرجة (موافق بشدة، موافق، محايد، غير موافق، غير موافق بشدة).

شاكراً تعاونكم وجهودكم المبذولة وجزاكم الله خيراً

اسم المحكم:

الدرجة العلمية:

التخصص:

مكان العمل:

رقم الجوال:

الباحثة

القسم الاول : البيانات الاساسية

يرجى وضع علامة (x) في المربع المخصص للإجابة :

1. الجنس :
   ذكر ☐ انثى ☐
2. العمر
   اقل من 30 سنة ☐ 30 – 39 سنة ☐
   40 – 49 سنة ☐ 50 سنة فأكثر ☐
3. الحالة الاجتماعية
   اعزب ☐ متزوج ☐
4. العمل
   مدير / رئيس قسم ☐ موظف إداري ☐
   موظف غير إداري ☐ أخرى تذكر ( )
5. سنوات الخدمة:
   اقل من 5 سنوات ☐ 5 – 9 سنوات ☐
   10 – 14 سنوات ☐ 15 سنة أو أكثر ☐
6. التحصيل العلمي :
   ثانوية فأقل ☐ جامعية ☐
   دراسات عليا ☐

القسم الثاني : تحليل المخاطر

الرقم	الفقرات	درجة الاجابة				
مستوى المخاطر المحتملة في اختيار مواقع المباني العامة و تطبيق معايير تحديد المباني العامة						
من حيث		**موافق بشدة**	**موافق**	**محايد**	**غير موافق**	**غير موافق بشدة**
	تقوم المباني العامة بتوفير مواقف سيارت كافية لمستخدمي المنشأة					
	تضع المباني العامة عند التخطيط لاختيار موقع البناء أولوية سهولة الوصول بسهولة إلى الموقع					
	تضع المباني العامة عند التخطيط لاختيار موقع البناء أولوية سهولة الوصول بسهولة إلى الموقع في حالات الطوارئ.					
	تأخذ المباني العامة بعين الاعتبار عند اختيار الموقع تحقيق رغبة السكان بالشكل المطلوب.					
	تراعي المباني العامة عند التخطيط لإنشاء مواقع الأبنية الابتعاد عن الأماكن الملوثة حفاظا على سلامة السكان					
	تتخلص المباني العامة من النفايات والانبعاثات بطرق منهجية موصى عليها عالميا للتخفيف من أشكال التلوث المختلفة.					
	تحرص المباني العامة عند ختير مواقع الأبنية أن تكون قريبة من الأماكن السكنية					
	يلعب حسن اختيار الموقع دورا كبيرا في الحد من مخاطر الأزمات المرورية الخانقة.					
	تحرص المباني العامة عند اختيار الموقع على توفير ممرات خاصة بالمشاة					
	يقدم الموقع خدماته للسكان بالشكل المطلوب					

انتهت الأسئلة
شاكرة جهودكم

Appendix III
the General Assembly members letter

نقابة المهندسين الأردنيين
Jordan Engineers Association

الرقم : ن م ٤٣٢/ ٦/ ٢٠٢١
التاريخ : ٣/ ١/ ٢٠٢١
الموضوع : اعضاء الهيئة العامة

السادة جامعة مؤتة المحترمين

الموضوع :اعضاء الهيئة العامة

تحية طيبة وبعد ،،،،،،،

يهديكم رئيس و اعضاء مجلس فرع العقبة اطيب التحيات , بناء على طلبكم بتزويدكم باعضاء الهيئة العامة للمهندسين تخصص المعماري و المدني لمحافظة فرع العقبة لغاية استكمال متطلبات الحصول على رسالة الماجستير "اثر تحليل المخاطر على اختيار مواقع المباني العامة "للمهندسة عنان شاهر الطراونة فان اعداد المهندسين المدني و المعماري تتراوح كما يلي :

الشعبة المدنية	752 مهندس
الشعبة المعمارية	106 مهندس

شاكرين لكم حسن تعاونكم

"واقبلوا فائق الاحترام والتقدير"

رئيس مجلس فرع العقبة

المهندس عامر الحباشنة

نقابة المهندسين
فرع العقبة

Appendix IV
Analysis Outputs

```
GET
  FILE='C:\Users\DELL\Desktop\تحليل عنان مهندسين.sav'.
DATASET NAME DataSet3 WINDOW=FRONT.
FACTOR
  /VARIABLES A1 A2 A3 A4 A5 A6 A7 A8
  /MISSING LISTWISE
  /ANALYSIS A1 A2 A3 A4 A5 A6 A7 A8
  /PRINT INITIAL KMO EXTRACTION
  /CRITERIA MINEIGEN(1) ITERATE(25)
  /EXTRACTION PC
  /ROTATION NOROTATE
  /METHOD=CORRELATION.
```

Factor Analysis

Notes

Output Created		29-NOV-2020 23:53:47
Comments		
Input	Data	C:\Users\DELL\Desktop\ تحليل عنان مهندسين.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	104
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.
Syntax		FACTOR /VARIABLES A1 A2 A3 A4 A5 A6 A7 A8 /MISSING LISTWISE /ANALYSIS A1 A2 A3 A4 A5 A6 A7 A8 /PRINT INITIAL KMO EXTRACTION /CRITERIA MINEIGEN(1) ITERATE(25) /EXTRACTION PC /ROTATION NOROTATE /METHOD=CORRELATION.
Resources	Processor Time	00:00:00.03
	Elapsed Time	00:00:00.02
	Maximum Memory Required	9264 (9.047K) bytes

[DataSet3] C:\Users\DELL\Desktop\تحليل عنان مهندسين.sav

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.859
Bartlett's Test of Sphericity	Approx. Chi-Square	312.559
	df	28
	Sig.	.000

Communalities

	Initial	Extraction
A1	1.000	.743
A2	1.000	.624
A3	1.000	.649
A4	1.000	.613
A5	1.000	.625
A6	1.000	.600
A7	1.000	.541
A8	1.000	.693

Extraction Method: Principal Component Analysis.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.043	50.539	50.539	4.043	50.539	50.539
2	1.045	13.064	63.602	1.045	13.064	63.602
3	.695	8.685	72.287			
4	.576	7.205	79.492			
5	.544	6.796	86.288			
6	.429	5.365	91.654			
7	.379	4.731	96.385			
8	.289	3.615	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component	
	1	2
A1	.552	-.662-
A2	.753	-.238-
A3	.804	-.047-
A4	.781	-.062-
A5	.703	.363
A6	.771	-.078-
A7	.724	.128
A8	.551	.624

Extraction Method: Principal Component Analysis.[a]
a. 2 components extracted.

```
FACTOR
  /VARIABLES B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11
  /MISSING LISTWISE
  /ANALYSIS B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11
  /PRINT INITIAL KMO EXTRACTION
  /CRITERIA MINEIGEN(1) ITERATE(25)
  /EXTRACTION PC
  /ROTATION NOROTATE
  /METHOD=CORRELATION.
```

Factor Analysis

Notes

Output Created		29-NOV-2020 23:54:19
Comments		
Input	Data	C:\Users\DELL\Desktop\ تحليل عنان مهندسين.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	104
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.
Syntax		FACTOR /VARIABLES B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 /MISSING LISTWISE /ANALYSIS B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 /PRINT INITIAL KMO EXTRACTION /CRITERIA MINEIGEN(1) ITERATE(25) /EXTRACTION PC /ROTATION NOROTATE /METHOD=CORRELATION.
Resources	Processor Time	00:00:00.03
	Elapsed Time	00:00:00.04
	Maximum Memory Required	16224 (15.844K) bytes

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.743
Bartlett's Test of Sphericity	Approx. Chi-Square	353.936
	df	55
	Sig.	.000

Communalities

	Initial	Extraction
B1	1.000	.417
B2	1.000	.477
B3	1.000	.660
B4	1.000	.592
B5	1.000	.600
B6	1.000	.635
B7	1.000	.619
B8	1.000	.671
B9	1.000	.759
B10	1.000	.475
B11	1.000	.617

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.780	34.361	34.361	3.780	34.361	34.361
2	1.647	14.976	49.337	1.647	14.976	49.337
3	1.095	9.957	59.293	1.095	9.957	59.293
4	.913	8.296	67.590			
5	.804	7.308	74.898			
6	.764	6.942	81.840			
7	.611	5.557	87.397			
8	.465	4.230	91.626			
9	.408	3.713	95.340			
10	.317	2.884	98.224			
11	.195	1.776	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component		
	1	2	3
B1	.521	.250	-.289-
B2	.506	.441	.163
B3	.163	.315	.731
B4	.644	-.207-	-.366-
B5	.717	-.275-	-.104-
B6	.756	-.213-	-.132-
B7	.255	.723	-.179-
B8	.793	-.166-	.122
B9	.720	-.179-	.457
B10	.689	.021	.023
B11	.201	.738	-.179-

Extraction Method: Principal Component Analysis.[a]
a. 3 components extracted.

```
FACTOR
  /VARIABLES C1 C2 C3 C4 C5 C6 C7 C8
  /MISSING LISTWISE
  /ANALYSIS C1 C2 C3 C4 C5 C6 C7 C8
  /PRINT INITIAL KMO EXTRACTION
  /CRITERIA MINEIGEN(1) ITERATE(25)
  /EXTRACTION PC
  /ROTATION NOROTATE
  /METHOD=CORRELATION.
```

Factor Analysis

Notes

Output Created		29-NOV-2020 23:54:38
Comments		
Input	Data	C:\Users\DELL\Desktop\ تحليل عنان مهندسين.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	104
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.
Syntax		FACTOR /VARIABLES C1 C2 C3 C4 C5 C6 C7 C8 /MISSING LISTWISE /ANALYSIS C1 C2 C3 C4 C5 C6 C7 C8 /PRINT INITIAL KMO EXTRACTION /CRITERIA MINEIGEN(1) ITERATE(25) /EXTRACTION PC /ROTATION NOROTATE /METHOD=CORRELATION.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.01
	Maximum Memory Required	9264 (9.047K) bytes

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.792
Bartlett's Test of Sphericity	Approx. Chi-Square	243.928
	df	28
	Sig.	.000

Communalities

	Initial	Extraction
C1	1.000	.751
C2	1.000	.694
C3	1.000	.594
C4	1.000	.683
C5	1.000	.751
C6	1.000	.611
C7	1.000	.886
C8	1.000	.696

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.364	42.049	42.049	3.364	42.049	42.049
2	1.273	15.913	57.962	1.273	15.913	57.962
3	1.029	12.865	70.827	1.029	12.865	70.827
4	.588	7.353	78.180			
5	.553	6.910	85.091			
6	.468	5.844	90.935			
7	.417	5.207	96.142			
8	.309	3.858	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component		
	1	2	3
C1	.476	.676	-.259-
C2	.538	.426	-.472-
C3	.731	-.169-	.179
C4	.755	-.312-	-.127-
C5	.800	-.162-	-.290-
C6	.750	-.142-	.167
C7	.239	.660	.627
C8	.696	-.164-	.431

Extraction Method: Principal Component Analysis.[a]
a. 3 components extracted.

```
FACTOR
  /VARIABLES D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11
  /MISSING LISTWISE
  /ANALYSIS D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11
  /PRINT INITIAL KMO EXTRACTION
  /CRITERIA MINEIGEN(1) ITERATE(25)
  /EXTRACTION PC
  /ROTATION NOROTATE
  /METHOD=CORRELATION.
```

Factor Analysis

Notes

Output Created		29-NOV-2020 23:54:57
Comments		
Input	Data	C:\Users\DELL\Desktop\ تحليل عنان مهندسين.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	104
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.
Syntax		FACTOR /VARIABLES D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 /MISSING LISTWISE /ANALYSIS D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 /PRINT INITIAL KMO EXTRACTION /CRITERIA MINEIGEN(1) ITERATE(25) /EXTRACTION PC /ROTATION NOROTATE /METHOD=CORRELATION.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.02
	Maximum Memory Required	16224 (15.844K) bytes

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.770
Bartlett's Test of Sphericity	Approx. Chi-Square	424.354
	df	55
	Sig.	.000

Communalities

	Initial	Extraction
D1	1.000	.544
D2	1.000	.653
D3	1.000	.787
D4	1.000	.594
D5	1.000	.517
D6	1.000	.612
D7	1.000	.566
D8	1.000	.693
D9	1.000	.608
D10	1.000	.695
D11	1.000	.737

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.033	36.659	36.659	4.033	36.659	36.659
2	1.865	16.955	53.615	1.865	16.955	53.615
3	1.109	10.080	63.695	1.109	10.080	63.695
4	.925	8.407	72.101			
5	.685	6.230	78.331			
6	.655	5.959	84.290			
7	.548	4.980	89.270			
8	.367	3.337	92.607			
9	.316	2.873	95.480			
10	.274	2.494	97.974			
11	.223	2.026	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component		
	1	2	3
D1	.429	.280	-.530-
D2	.755	-.276-	.083
D3	.681	.383	-.421-
D4	.762	-.107-	.048
D5	.076	.528	.482
D6	.539	.539	.176
D7	.458	.393	.449
D8	.584	-.489-	.335
D9	.602	.476	-.136-
D10	.737	-.371-	.117
D11	.694	-.474-	-.176-

Extraction Method: Principal Component Analysis.[a]
a. 3 components extracted.

```
FACTOR
  /VARIABLES E1 E2 E3 E4 E5
  /MISSING LISTWISE
  /ANALYSIS E1 E2 E3 E4 E5
  /PRINT INITIAL KMO EXTRACTION
  /CRITERIA MINEIGEN(1) ITERATE(25)
  /EXTRACTION PC
  /ROTATION NOROTATE
  /METHOD=CORRELATION.
```

Factor Analysis

Notes

Output Created		29-NOV-2020 23:55:14
Comments		
Input	Data	C:\Users\DELL\Desktop\تحليل عنان مهندسين.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	104
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.
Syntax		FACTOR /VARIABLES E1 E2 E3 E4 E5 /MISSING LISTWISE /ANALYSIS E1 E2 E3 E4 E5 /PRINT INITIAL KMO EXTRACTION /CRITERIA MINEIGEN(1) ITERATE(25) /EXTRACTION PC /ROTATION NOROTATE /METHOD=CORRELATION.
Resources	Processor Time	00:00:00.05
	Elapsed Time	00:00:00.02
	Maximum Memory Required	4248 (4.148K) bytes

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.678
Bartlett's Test of Sphericity	Approx. Chi-Square	136.097
	df	10
	Sig.	.000

Communalities

	Initial	Extraction
E1	1.000	.077
E2	1.000	.725
E3	1.000	.765
E4	1.000	.508
E5	1.000	.338

Extraction Method: Principal Component Analysis.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.413	48.251	48.251	2.413	48.251	48.251
2	.987	19.746	67.997			
3	.754	15.082	83.079			
4	.611	12.214	95.293			
5	.235	4.707	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
E1	.277
E2	.851
E3	.875
E4	.713
E5	.581

Extraction Method: Principal Component Analysis.[a]
a. 1 components extracted.

```
FACTOR
  /VARIABLES F1 F2 F3 F4 F5 F6 F7
  /MISSING LISTWISE
  /ANALYSIS F1 F2 F3 F4 F5 F6 F7
  /PRINT INITIAL KMO EXTRACTION
  /CRITERIA MINEIGEN(1) ITERATE(25)
  /EXTRACTION PC
  /ROTATION NOROTATE
  /METHOD=CORRELATION.
```

Factor Analysis

Notes

Output Created		29-NOV-2020 23:55:31
Comments		
Input	Data	C:\Users\DELL\Desktop\ تحليل عنان مهندسين.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	104
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.
Syntax		FACTOR /VARIABLES F1 F2 F3 F4 F5 F6 F7 /MISSING LISTWISE /ANALYSIS F1 F2 F3 F4 F5 F6 F7 /PRINT INITIAL KMO EXTRACTION /CRITERIA MINEIGEN(1) ITERATE(25) /EXTRACTION PC /ROTATION NOROTATE /METHOD=CORRELATION.
Resources	Processor Time	00:00:00.03
	Elapsed Time	00:00:00.03
	Maximum Memory Required	7376 (7.203K) bytes

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.787
Bartlett's Test of Sphericity	Approx. Chi-Square	238.661
	df	21
	Sig.	.000

Communalities

	Initial	Extraction
F1	1.000	.748
F2	1.000	.609
F3	1.000	.756
F4	1.000	.521
F5	1.000	.567
F6	1.000	.601
F7	1.000	.602

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.356	47.938	47.938	3.356	47.938	47.938
2	1.048	14.978	62.916	1.048	14.978	62.916
3	.795	11.358	74.273			
4	.682	9.748	84.021			
5	.451	6.446	90.467			
6	.404	5.776	96.243			
7	.263	3.757	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component	
	1	2
F1	.306	.809
F2	.737	-.256-
F3	.817	-.299-
F4	.637	.339
F5	.736	.159
F6	.770	.089
F7	.714	-.303-

Extraction Method: Principal Component Analysis.[a]
a. 2 components extracted.

```
FACTOR
  /VARIABLES G1 G2 G3 G4 G5 G6 G7
  /MISSING LISTWISE
  /ANALYSIS G1 G2 G3 G4 G5 G6 G7
  /PRINT INITIAL KMO EXTRACTION
  /CRITERIA MINEIGEN(1) ITERATE(25)
  /EXTRACTION PC
  /ROTATION NOROTATE
  /METHOD=CORRELATION.
```

Factor Analysis

Notes

Output Created		29-NOV-2020 23:55:46
Comments		
Input	Data	C:\Users\DELL\Desktop\ تحليل عنان مهندسين.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	104
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.
Syntax		FACTOR /VARIABLES G1 G2 G3 G4 G5 G6 G7 /MISSING LISTWISE /ANALYSIS G1 G2 G3 G4 G5 G6 G7 /PRINT INITIAL KMO EXTRACTION /CRITERIA MINEIGEN(1) ITERATE(25) /EXTRACTION PC /ROTATION NOROTATE /METHOD=CORRELATION.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.02
	Maximum Memory Required	7376 (7.203K) bytes

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.859
Bartlett's Test of Sphericity	Approx. Chi-Square	288.374
	df	21
	Sig.	.000

Communalities

	Initial	Extraction
G1	1.000	.919
G2	1.000	.658
G3	1.000	.709
G4	1.000	.671
G5	1.000	.610
G6	1.000	.592
G7	1.000	.600

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues Total	% of Variance	Cumulative %	Extraction Sums of Squared Loadings Total	% of Variance	Cumulative %
1	3.722	53.173	53.173	3.722	53.173	53.173
2	1.037	14.809	67.982	1.037	14.809	67.982
3	.677	9.666	77.647			
4	.494	7.064	84.711			
5	.416	5.943	90.654			
6	.385	5.501	96.154			
7	.269	3.846	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component 1	2
G1	.207	.936
G2	.783	.210
G3	.842	.029
G4	.819	.004
G5	.766	-.154-
G6	.766	-.075-
G7	.716	-.294-

Extraction Method: Principal Component Analysis.[a]
a. 2 components extracted.

```
RELIABILITY
  /VARIABLES=A1 A2 A3 A4 A5 A6 A7
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability

Notes

Output Created		29-NOV-2020 23:56:47
Comments		
Input	Data	C:\Users\DELL\Desktop\ تحليل عنان مهندسين.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	104
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=A1 A2 A3 A4 A5 A6 A7 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.00

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	104	100.0
	Excluded[a]	0	.0
	Total	104	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.854	7

```
RELIABILITY
  /VARIABLES=B1 B2 B4 B5 B6 B8 B9 B10
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability

Notes

Output Created		29-NOV-2020 23:57:41
Comments		
Input	Data	C:\Users\DELL\Desktop\تحليل عنان مهندسين.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	104
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=B1 B2 B4 B5 B6 B8 B9 B10 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00.03
	Elapsed Time	00:00:00.01

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	104	100.0
	Excluded[a]	0	.0
	Total	104	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.831	8

```
RELIABILITY
  /VARIABLES=C2 C3 C4 C5 C6 C8
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability

Notes

Output Created		29-NOV-2020 23:58:21
Comments		
Input	Data	C:\Users\DELL\Desktop\ تحليل عنان مهندسين.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	104
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=C2 C3 C4 C5 C6 C8 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.00

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	104	100.0
	Excluded[a]	0	.0
	Total	104	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.820	6

```
RELIABILITY
  /VARIABLES=D2 D3 D4 D6 D7 D8 D9 D10 D11
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability

Notes

Output Created		29-NOV-2020 23:58:57
Comments		
Input	Data	C:\Users\DELL\Desktop\ تحليل عنان مهندسين.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	104
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=D2 D3 D4 D6 D7 D8 D9 D10 D11 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.01

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	104	100.0
	Excluded[a]	0	.0
	Total	104	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.828	9

```
RELIABILITY
  /VARIABLES=E2 E3 E4 E5
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability

Notes

Output Created		29-NOV-2020 23:59:24
Comments		
Input	Data	C:\Users\DELL\Desktop\ تحليل عنان مهندسين.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	104
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=E2 E3 E4 E5 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.01

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	104	100.0
	Excluded[a]	0	.0
	Total	104	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.753	4

```
RELIABILITY
  /VARIABLES=F2 F3 F4 F5 F6 F7
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability

Notes

Output Created		29-NOV-2020 23:59:37
Comments		
Input	Data	C:\Users\DELL\Desktop\ تحليل عنان مهندسين.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	104
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=F2 F3 F4 F5 F6 F7 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.01

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	104	100.0
	Excluded[a]	0	.0
	Total	104	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.830	6

```
RELIABILITY
  /VARIABLES=G2 G3 G4 G5 G6 G7
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability

Notes

Output Created		29-NOV-2020 23:59:50
Comments		
Input	Data	C:\Users\DELL\Desktop\ تحليل عنان مهندسين.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	104
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=G2 G3 G4 G5 G6 G7 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00.03
	Elapsed Time	00:00:00.01

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	104	100.0
	Excluded[a]	0	.0
	Total	104	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.872	6

DESCRIPTIVES VARIABLES=AVEA AVEB AVEC AVED AVEE AVEF AVEG
  /STATISTICS=MEAN STDDEV MIN MAX KURTOSIS SKEWNESS.

Descriptives

Notes

Output Created		30-NOV-2020 00:01:22
Comments		
Input	Data	C:\Users\DELL\Desktop\ تحليل عنان مهندسين.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	104
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	All non-missing data are used.
Syntax		DESCRIPTIVES VARIABLES=AVEA AVEB AVEC AVED AVEE AVEF AVEG /STATISTICS=MEAN STDDEV MIN MAX KURTOSIS SKEWNESS.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.01

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
AVEA	104	2.14	5.00	3.7624	.75083	-.302-	.237
AVEB	104	2.13	5.00	3.5577	.68197	-.030-	.237
AVEC	104	1.67	5.00	3.5288	.69147	-.314-	.237
AVED	104	1.89	5.00	3.5321	.62638	-.043-	.237
AVEE	104	1.50	5.00	3.5312	.67881	-.452-	.237
AVEF	104	1.33	5.00	3.3846	.70904	-.310-	.237
AVEG	104	1.50	5.00	3.5256	.78062	-.701-	.237
Valid N (listwise)	104						

Descriptive Statistics

	Kurtosis	
	Statistic	Std. Error
AVEA	-.777-	.469
AVEB	-.697-	.469
AVEC	-.118-	.469
AVED	-.299-	.469
AVEE	.170	.469
AVEF	.237	.469
AVEG	-.066-	.469
Valid N (listwise)		

```
CORRELATIONS
  /VARIABLES=AVEA AVEB AVEC AVED AVEE AVEF AVEG
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

Notes

Output Created		30-NOV-2020 00:01:35
Comments		
Input	Data	C:\Users\DELL\Desktop\ تحليل عنان مهندسين.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	104
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each pair of variables are based on all the cases with valid data for that pair.
Syntax		CORRELATIONS /VARIABLES=AVEA AVEB AVEC AVED AVEE AVEF AVEG /PRINT=TWOTAIL NOSIG /MISSING=PAIRWISE.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.01

Correlations

		AVEA	AVEB	AVEC	AVED	AVEE	AVEF
AVEA	Pearson Correlation	1	.671**	.575**	.315**	.347**	.568**
	Sig. (2-tailed)		.000	.000	.001	.000	.000
	N	104	104	104	104	104	104
AVEB	Pearson Correlation	.671**	1	.698**	.577**	.558**	.615**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	104	104	104	104	104	104
AVEC	Pearson Correlation	.575**	.698**	1	.620**	.552**	.662**
	Sig. (2-tailed)	.000	.000		.000	.000	.000
	N	104	104	104	104	104	104
AVED	Pearson Correlation	.315**	.577**	.620**	1	.597**	.497**
	Sig. (2-tailed)	.001	.000	.000		.000	.000
	N	104	104	104	104	104	104
AVEE	Pearson Correlation	.347**	.558**	.552**	.597**	1	.640**
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	104	104	104	104	104	104
AVEF	Pearson Correlation	.568**	.615**	.662**	.497**	.640**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	104	104	104	104	104	104
AVEG	Pearson Correlation	.509**	.735**	.678**	.531**	.659**	.792**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	104	104	104	104	104	104

Correlations

		AVEG
AVEA	Pearson Correlation	.509**
	Sig. (2-tailed)	.000
	N	104
AVEB	Pearson Correlation	.735**
	Sig. (2-tailed)	.000
	N	104
AVEC	Pearson Correlation	.678**
	Sig. (2-tailed)	.000
	N	104
AVED	Pearson Correlation	.531**
	Sig. (2-tailed)	.000
	N	104
AVEE	Pearson Correlation	.659**
	Sig. (2-tailed)	.000
	N	104
AVEF	Pearson Correlation	.792**
	Sig. (2-tailed)	.000
	N	104
AVEG	Pearson Correlation	1
	Sig. (2-tailed)	
	N	104

**. Correlation is significant at the 0.01 level (2-tailed).

```
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA COLLIN TOL
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT AVEE
  /METHOD=ENTER AVEA AVEB AVEC AVED.
```

Regression

Notes

Output Created		30-NOV-2020 00:01:54
Comments		
Input	Data	C:\Users\DELL\Desktop\ تحليل عنان مهندسين.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	104
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any variable used.
Syntax		REGRESSION /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA COLLIN TOL /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT AVEE /METHOD=ENTER AVEA AVEB AVEC AVED.
Resources	Processor Time	00:00:00.03
	Elapsed Time	00:00:00.02
	Memory Required	56672 bytes
	Additional Memory Required for Residual Plots	0 bytes

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	AVED, AVEA, AVEC, AVEB[b]	.	Enter

a. Dependent Variable: AVEE
b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.661[a]	.437	.414	.51945

a. Predictors: (Constant), AVED, AVEA, AVEC, AVEB

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20.748	4	5.187	19.224	.000[b]
	Residual	26.713	99	.270		
	Total	47.461	103			

a. Dependent Variable: AVEE
b. Predictors: (Constant), AVED, AVEA, AVEC, AVEB

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	Collinearity Statistics Tolerance
1	(Constant)	.794	.342		2.323	.022	
	AVEA	-.034-	.096	-.037-	-.351-	.727	.503
	AVEB	.256	.125	.257	2.049	.043	.362
	AVEC	.174	.115	.177	1.508	.135	.411
	AVED	.380	.110	.350	3.439	.001	.548

Coefficients[a]

Model		Collinearity Statistics VIF
1	(Constant)	
	AVEA	1.987
	AVEB	2.763
	AVEC	2.434
	AVED	1.824

a. Dependent Variable: AVEE

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions (Constant)	AVEA	AVEB	AVEC
1	1	4.936	1.000	.00	.00	.00	.00
	2	.025	14.092	.12	.37	.03	.00
	3	.020	15.794	.63	.07	.04	.17
	4	.011	21.606	.06	.00	.35	.80
	5	.009	24.067	.19	.56	.58	.03

Collinearity Diagnostics[a]

Model	Dimension	Variance Proportions AVED
1	1	.00
	2	.22
	3	.07
	4	.18
	5	.53

a. Dependent Variable: AVEE

```
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT المعايير
  /METHOD=ENTER المخاطر.
```

Regression

Notes

Output Created		30-NOV-2020 00:03:00
Comments		
Input	Data	C:\Users\DELL\Desktop\تحليل عنان مهندسين.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	104
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any variable used.
Syntax		REGRESSION /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT المعايير /METHOD=ENTER المخاطر.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.02
	Memory Required	55120 bytes
	Additional Memory Required for Residual Plots	0 bytes

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	المخاطر[b]	.	Enter

a. Dependent Variable: المعايير
b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.773[a]	.597	.593	.41263

a. Predictors: (Constant), المخاطر

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	25.717	1	25.717	151.041	.000[b]
	Residual	17.367	102	.170		
	Total	43.085	103			

a. Dependent Variable: المعايير
b. Predictors: (Constant), المخاطر

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	.320	.260		1.228	.222
	المخاطر	.879	.072	.773	12.290	.000

a. Dependent Variable: المعايير

```
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT AVEE
  /METHOD=ENTER AVEA AVEB AVEC AVED.
```

Regression

Notes

Output Created		30-NOV-2020 00:03:16
Comments		
Input	Data	C:\Users\DELL\Desktop\ تحليل عنان مهندسين.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	104
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any variable used.
Syntax		REGRESSION /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT AVEE /METHOD=ENTER AVEA AVEB AVEC AVED.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.02
	Memory Required	56672 bytes
	Additional Memory Required for Residual Plots	0 bytes

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	AVED, AVEA, AVEC, AVEB[b]	.	Enter

a. Dependent Variable: AVEE
b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.661[a]	.437	.414	.51945

a. Predictors: (Constant), AVED, AVEA, AVEC, AVEB

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20.748	4	5.187	19.224	.000[b]
	Residual	26.713	99	.270		
	Total	47.461	103			

a. Dependent Variable: AVEE
b. Predictors: (Constant), AVED, AVEA, AVEC, AVEB

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.794	.342		2.323	.022
	AVEA	-.034-	.096	-.037-	-.351-	.727
	AVEB	.256	.125	.257	2.049	.043
	AVEC	.174	.115	.177	1.508	.135
	AVED	.380	.110	.350	3.439	.001

a. Dependent Variable: AVEE

```
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT AVEF
  /METHOD=ENTER AVEA AVEB AVEC AVED.
```

Regression

Notes

Output Created		30-NOV-2020 00:03:26
Comments		
Input	Data	C:\Users\DELL\Desktop\ تحليل عنان مهندسين.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	104
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any variable used.
Syntax		REGRESSION /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT AVEF /METHOD=ENTER AVEA AVEB AVEC AVED.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.02
	Memory Required	56672 bytes
	Additional Memory Required for Residual Plots	0 bytes

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	AVED, AVEA, AVEC, AVEB[b]	.	Enter

a. Dependent Variable: AVEF
b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.717[a]	.513	.494	.50447

a. Predictors: (Constant), AVED, AVEA, AVEC, AVEB

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	26.587	4	6.647	26.118	.000[b]
	Residual	25.195	99	.254		
	Total	51.782	103			

a. Dependent Variable: AVEF
b. Predictors: (Constant), AVED, AVEA, AVEC, AVEB

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	.269	.332		.811	.419
	AVEA	.217	.093	.229	2.322	.022
	AVEB	.148	.121	.142	1.222	.225
	AVEC	.364	.112	.355	3.242	.002
	AVED	.139	.107	.123	1.296	.198

a. Dependent Variable: AVEF

```
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT AVEG
  /METHOD=ENTER AVEA AVEB AVEC AVED.
```

Regression

Notes

Output Created		30-NOV-2020 00:03:37
Comments		
Input	Data	C:\Users\DELL\Desktop\ تحليل عنان مهندسين.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	104
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any variable used.
Syntax		REGRESSION /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT AVEG /METHOD=ENTER AVEA AVEB AVEC AVED.
Resources	Processor Time	00:00:00.05
	Elapsed Time	00:00:00.02
	Memory Required	56672 bytes
	Additional Memory Required for Residual Plots	0 bytes

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	AVED, AVEA, AVEC, AVEB[b]	.	Enter

a. Dependent Variable: AVEG
b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.772[a]	.596	.579	.50631

a. Predictors: (Constant), AVED, AVEA, AVEC, AVEB

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	37.386	4	9.346	36.459	.000[b]
	Residual	25.379	99	.256		
	Total	62.765	103			

a. Dependent Variable: AVEG
b. Predictors: (Constant), AVED, AVEA, AVEC, AVEB

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	.093	.333		.278	.782
	AVEA	-.022-	.094	-.021-	-.234-	.815
	AVEB	.577	.122	.504	4.744	.000
	AVEC	.341	.113	.302	3.028	.003
	AVED	.074	.108	.059	.685	.495

a. Dependent Variable: AVEG

```
FACTOR
  /VARIABLES A1 A2 A3 A4 A5 A6 A7 A8 A9 A10
  /MISSING LISTWISE
  /ANALYSIS A1 A2 A3 A4 A5 A6 A7 A8 A9 A10
  /PRINT INITIAL KMO EXTRACTION
  /CRITERIA MINEIGEN(1) ITERATE(25)
  /EXTRACTION PC
  /ROTATION NOROTATE
  /METHOD=CORRELATION.
```

Factor Analysis

Notes

Output Created		30-NOV-2020 00:04:43
Comments		
Input	Data	C:\Users\DELL\Desktop\ تحليل عنان السكان.sav
	Active Dataset	DataSet4
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	223
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.
Syntax		FACTOR /VARIABLES A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 /MISSING LISTWISE /ANALYSIS A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 /PRINT INITIAL KMO EXTRACTION /CRITERIA MINEIGEN(1) ITERATE(25) /EXTRACTION PC /ROTATION NOROTATE /METHOD=CORRELATION.
Resources	Processor Time	00:00:00.05
	Elapsed Time	00:00:00.01
	Maximum Memory Required	13688 (13.367K) bytes

[DataSet4] C:\Users\DELL\Desktop\تحليل عنان السكان.sav

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.913
Bartlett's Test of Sphericity	Approx. Chi-Square	1011.819
	df	45
	Sig.	.000

Communalities

	Initial	Extraction
A1	1.000	.640
A2	1.000	.577
A3	1.000	.681
A4	1.000	.546
A5	1.000	.587
A6	1.000	.632
A7	1.000	.175
A8	1.000	.154
A9	1.000	.569
A10	1.000	.558

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.119	51.188	51.188	5.119	51.188	51.188
2	.909	9.086	60.273			
3	.883	8.834	69.107			
4	.657	6.566	75.673			
5	.580	5.800	81.472			
6	.482	4.816	86.288			
7	.403	4.028	90.317			
8	.395	3.952	94.269			
9	.331	3.312	97.581			
10	.242	2.419	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
A1	.800
A2	.760
A3	.825
A4	.739
A5	.766
A6	.795
A7	.418
A8	.392
A9	.754
A10	.747

Extraction Method: Principal Component Analysis.[a]
a. 1 components extracted.

```
RELIABILITY
  /VARIABLES=A1 A2 A3 A4 A5 A6 A7 A8 A9 A10
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability

Notes

Output Created		30-NOV-2020 00:05:04
Comments		
Input	Data	C:\Users\DELL\Desktop\ تحليل عنان السكان.sav
	Active Dataset	DataSet4
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	223
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.01

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	223	100.0
	Excluded[a]	0	.0
	Total	223	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.888	10

DESCRIPTIVES VARIABLES=A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 AVEA
/STATISTICS=MEAN STDDEV MIN MAX.

Descriptives

Notes

Output Created		30-NOV-2020 00:05:16
Comments		
Input	Data	C:\Users\DELL\Desktop\ تحليل عنان السكان.sav
	Active Dataset	DataSet4
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	223
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	All non-missing data are used.
Syntax		DESCRIPTIVES VARIABLES=A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 AVEA /STATISTICS=MEAN STDDEV MIN MAX.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.01

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
A1	223	1.00	5.00	3.3991	1.31087
A2	223	1.00	5.00	3.6726	.98891
A3	223	1.00	5.00	3.6457	1.13307
A4	223	1.00	5.00	3.4709	1.04743
A5	223	1.00	5.00	3.6368	1.15778
A6	223	1.00	5.00	3.5112	1.18116
A7	223	1.00	5.00	3.4126	1.03551
A8	223	1.00	5.00	4.1435	.97123
A9	223	1.00	5.00	3.7085	1.06554
A10	223	1.00	5.00	3.4574	1.02523
AVEA	223	1.00	5.00	3.6058	.77379
Valid N (listwise)	223				

Personal information

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Year: 2021