

**The level of Application of Total Quality Management in Achieving Business
Sustainability and its Relationship to Risk Management in Engineering
Project Companies in the Kingdom of Saudi Arabia**

Table of Contents

Topic	Page
Chapter One	
Introduction	
Research Problem	
Significance of the Study	
Study Objectives	
Study Questions	
Study Hypotheses	
The scientific theory used to prepare the research	
Chapter Two	
Previous Studies	
First: Arabic Studies	
Second: Foreign studies	
Theoretical Framework	
Total Quality Management	
The Origin and Development of TQM:	
Stages of the Development of the Concept of Total Quality Management	
General Concepts of Quality Management	
The Concept of Quality	
The Concept of Total Quality Management	
The Importance of Total Quality Management	
Goals of Total Quality Management	

Dimensions of Total Quality Management	
Risk Management	
The Origin of Risk Management	
The Concept of Risk Management	
Risk Management Objectives	
Business Sustainability	
The Concept of Sustainability	
Main Goals of Sustainability	
The Concept of Business Sustainability	
The Importance of Business Sustainability	
Dimensions of Business Sustainability	
Economic Sustainability Assessment Approaches	
Engineering Project Companies in Saudi Arabia	
Chapter Three Methodology and Procedures	
Study Methodology	
Study Population and Sample:	
Study Tools	
Validity of the Study Tools	
Study Tool Correction Procedures:	
Stability of study tools	
Statistical processing	
Chapter Four Data Analysis and Hypothesis Testing	
Introduction	
Description of the Study's Dimensions and Variables	

First: Description of the Total Quality Management (TQM) variable and its sub-dimensions	
Second: Description of the dependent variable (business sustainability) (results of the second question)	
Hypothesis Testing Results	
Results related to the second opportunity (results of the fifth question):	
Chapter Five Discussion of Results and Recommendations	
Introduction	
First: Results related to the first question	
Second: Results related to the second question:	
Third: Results related to the third question:	
Fourth: Results related to the fourth question:	
Recommendations	
Proposed Research	
references and sources	
Appendices	

List of tables

tables	Page
Values of internal consistency coefficients (Cronbach's alpha) for the study tools	
Descriptive statistical measures for the dimension (Leadership)	
Descriptive statistical measures for the dimension (continuous improvement)	
Descriptive statistical measures for the dimension (continuous improvement)	
Descriptive statistical measures for the dimension (customer satisfaction)	
Descriptive statistical measures for the dimension (work team)	
Descriptive statistical measures for the dimension (employee empowerment)	
Descriptive statistical measures for the (Economic Sustainability) items	
Descriptive statistical measures for the (Social Sustainability) items	
Descriptive statistical measures for the (Environmental Sustainability) items	
Descriptive Statistics Measures for the Risk Management Variable	
Results of Pearson's correlation coefficient between the application of total quality management and risk management in engineering project companies.	
Pearson's correlation coefficient results between the application of business sustainability to risk management in engineering project companies	

Chapter One

Introduction:

In light of economic development and global competition, organizations seek to realize the concept of sustainability to encompass all practices and behaviors that would limit or block competitors from imitating the organization's unique strategic strengths and capabilities or replacing them with other resources.

Hence, the principles of total quality have been embedded in all production and service operations. This aims to address emerging challenges related to competition at the local and global levels and achieve the highest levels of quality output. Hence, it is imperative to focus on the concept of quality in general and the concept of quality in particular (Al-Maadidi, 2016).

Quality has been defined as the provision of a product or service of a high level of distinguished quality, enabling it to meet the needs and desires of its customers in a manner that meets their expectations and achieves their satisfaction and happiness (Al-Sharif, 2021). Quality, according to Ishikawa, is defined as the degree to which a product meets customer needs when used. Kaynak (2013) defined quality management as a comprehensive management philosophy that inspires all functions within an organization to strive for continuous improvement. Addae-Korankeye (2013) defined quality management practices as vital techniques used by organizations to enhance the quality of service provided to customers to meet their needs and expectations and increase customer satisfaction. Accordingly, all quality-related functions are integrated throughout the organization.

Deming defined quality as addressing current and future customer needs. However, Asher pointed out that Total Quality Management (TQM) is a process of continuous improvement, whether involving individuals or departments, with a focus on meeting customer needs and desires.

Based on the above, TQM can be defined as the development and planning for continuous improvement of the quality of products and services by involving work teams within organizations and focusing on the quality of all departments to achieve customer satisfaction and meet their current and future needs.

Recent decades have witnessed many changes in the field of communications and information. In light of the concept of globalization, the world today has become known as a small village, and the system of free trade and global markets have become open to all producers. Under these circumstances, the risks facing organizations have become more significant than ever, requiring them to be confronted and managed, as they threaten organizations with extinction and exit from global markets. Therefore, predicting threats to the operational environment and using them as an effective means of overcoming risk to meet customer needs, desires, and expectations (Khaitan, 2022) is an effective means of overcoming risk to meet customer needs, desires, and expectations. Achieving customer satisfaction is one of the most important pillars of total quality management in any organization.

Research Problem

Recent years have witnessed numerous changes in global service organizations concerned with total quality management, including engineering project companies. The concept of risk management in engineering projects generally relates to a sense of security, stability, and reassurance from future risks, whether as an individual or as a commercial, industrial, production, or public sector. It helps grow businesses and increase productivity. As a result of a deep understanding of the concept of engineering projects and their risk management, companies strive to provide the best

engineering services by understanding the nature of customer needs and designing engineering programs most appropriate to their requirements. Relying on risk management in projects is essential if the goal is to achieve project success. It is impossible to implement any project without encountering risks during the project's progress, which necessitates developing a clear and well-thought-out risk management methodology to manage these risks in the right manner to achieve project objectives.

Engineering construction and building projects face many challenges. Challenges that can directly impact project success, necessitating an urgent need for risk management and quality assurance. The problem is that many projects are exposed to risks stemming from inadequate engineering assessment, leading to inappropriate foundation choices. If the engineering characteristics of a project are not accurately identified, this can have serious consequences for project safety and sustainability. Risks are compounded when teams fail to adhere to standards and good practices in implementation processes. Furthermore, the lack of an effective quality assurance system can lead to widespread errors and implementation defects. Project engineers may feel pressured to meet project deadlines, which can affect their ability to conduct necessary inspections. Quality assurance requires meticulous attention to detail and systematic work to avoid problems that could worsen over time.

Significance of the Study

This study derives its importance from two aspects:

1 .Theoretical Aspect:

This study derives its importance from the importance of its variables, as each variable is of undeniable importance. This study combined Total Quality Management (TQM) and Business Sustainability to establish a relationship between them through the mediating variable of risk management. TQM is a focus of interest

for all service-providing organizations at all levels and departments, as a long-term strategic development plan to ensure the continuity of providing the best services.

2 .Practical Aspect:

Ensuring Project Safety: It is hoped that the research will contribute to enhancing the safety of engineering projects by identifying potential risks associated with the engineering project, thereby reducing the likelihood of structural failure. It is hoped that this study will benefit all employees of engineering project companies and relevant segments of society. The research also provides valuable information and analysis that helps engineers and managers make informed decisions about appropriate foundation techniques and implementation processes, contributing to project success.

Study Objectives:

The study aims to achieve the following objectives:

- 1 .To demonstrate the level of implementation of business sustainability in engineering project companies in the Kingdom of Saudi Arabia.
- 2 .To identify the level of implementation of Total Quality Management (TQM) in engineering project companies in the Kingdom of Saudi Arabia.
3. Clarify whether there is a correlation between the application of Total Quality Management and business sustainability in risk management in engineering project companies.

Study Questions:

The study problem addressed the following main question: What is the impact of total quality management on achieving business sustainability? The mediating role of risk management in engineering project companies in the Kingdom of Saudi Arabia. A set of sub-questions branch out from the main question:

- 1 .What is the level of implementation of business sustainability in engineering project companies?

- 2 .What is the level of implementation of total quality management in engineering project companies?
3. What is the level of risk management in engineering project companies?
- 4 .Is there a correlation between the application of Total Quality Management (TQM) and risk management in engineering project companies?
5. Is there a correlation between the application of business sustainability and risk management in engineering project companies?

Study Hypotheses:

- 1 -Is there a correlation between the application of Total Quality Management (TQM) and risk management in engineering project companies?
- 2- Is there a correlation between the application of business sustainability and risk management in engineering project companies?

The scientific theory used to prepare the research:

This study derives from a set of terms, including the following:

-Total Quality Management: An organizational management approach based on the participation of all stakeholders to achieve success through customer satisfaction, which benefits everyone and society at large (Blounas, 2011).

-Business Sustainability: The practices performed by an organization that maintain the sustainability of its operations and the continuity of its activities by efficiently and effectively carrying out its activities at the economic, social, and environmental levels (Al-Hadrawi, 2020).

-Risk: Any undesirable activity in the production process that leads to waste of various organizational resources, such as defective, returned, damaged, and lost time (Al-Zoubi, 2019).

-Leadership: It is the act of inspiring, inspiring, or influencing others, making them more committed and more effective in accomplishing the tasks assigned to them (Al-Naimi, 2020).

-Team Building: It is the training of both management and the organization's workforce to create awareness, understanding, and accomplishment of the desired goals, and to develop their skills and work ethos (Blounas, 2011).

-Continuous Improvement: Focusing on the customer, identifying them, and determining their expectations and requirements (Al-Samman, 2016).

-Customer Satisfaction: Since the customer is the organization's primary goal and purpose, the secret to its success, and the measure of its progress, it is imperative to respond to their evolving desires, needs, and preferences (Al-Samman, 2016).

-The Economic Dimension: It is the impact of organizations on the economic conditions of their stakeholders and on economic systems at the national and global levels. Indicators of this impact on organizations and society include the flow of resources among various stakeholders (Al-Hadrawi, 2020).

-Social dimension: It is the awareness of the organization's responsibility for its actions, as well as a genuine and reliable long-term commitment to all business activities in order to successfully remain in the market for a long period of time (Al-Hadrawi, 2020).

-Environmental dimension: It is the preservation of factors and practices that contribute to environmental quality on a long-term basis, including the integrity of ecosystems, resilience, and biodiversity (Al-Hadrawi, 2020).

-Control of latent risks: It is the process that includes a method for controlling risks after analyzing and identifying them, whether they are risks from within or outside the organization, and regardless of their type, whether environmental, political, social, economic, or financial risks facing individuals, companies, and the state in general (Al-Zaabi, 2019).

- Risk prediction: It is the identification of means, methods, and procedures to address each risk, developing an alternative plan and a primary plan within the

company to address all risks, and establishing an integrated organization to implement plans to address them and monitor the results (Al-Zaabi, 2019).

Chapter Two

Previous Studies

First: Arabic Studies:

1- A study by Al-Ahmari and Abdul Qader, 2024, entitled "**The Impact of Implementing Total Quality Management on Job Performance in Saudi Universities (A Field Study at King Khalid University in Abha)**".

-This study sought to clarify the impact of implementing Total Quality Management on job performance, in addition to identifying the level of job performance of administrative employees at King Khalid University.

-The study adopted a quantitative approach, and a questionnaire was used as the primary tool to collect the data necessary to achieve the research objectives. (89) questionnaires were distributed to the study population.

-The study concluded that the dimensions of Total Quality Management, represented by (customer focus, teamwork, senior management commitment, and continuous improvement), positively impact job performance.

2 -A study by Udaybat, 2024, entitled "**Risk Management and Quality Assurance in the Implementation of Engineering Project Foundations by a Soil Engineer**".

-The research aimed to identify and evaluate the risks associated with implementing engineering project foundations, with a focus on the geological and geotechnical factors that affect foundation stability.

-The study followed a descriptive approach, as it was appropriate for the purposes of the study. A questionnaire consisting of (41) items was prepared. The study was distributed to a random sample of (120) agricultural engineers in Jordan working in (47) engineering offices.

-The results showed that the effective implementation of risk management strategies leads to improved foundation stability and reduced likelihood of structural failure. The research results also showed that continuous quality assurance during implementation processes contributes to accelerating completion and reducing costs associated with future repairs.

3 -A study (Habib and Al-Fakiki, 2023) entitled "**The Role of Total Quality Management in Achieving Competitive Advantage**".

-This study sought to explore the role played by Total Quality Management (TQM) in its dimensions (customer focus, employee participation, commitment of senior management and employees, continuous improvement, strategic planning, and training and development) in competitive advantage.

-To achieve the study's objectives and answer its questions, a qualitative approach based on literature references written in this field was used.

- The study concluded with a set of theoretical conclusions and recommendations, including: Total Quality Management plays a prominent role in achieving competitive advantage. There is also a correlation between Total Quality Management and competitive advantage. The study emphasized the importance of implementing Total Quality Management in organizations as it is considered a key factor in achieving competitive advantage. An effective approach and source for achieving competitive advantage, and the necessity of adopting Total Quality Management as a modern management method instead of the traditional management method in order to achieve the desired goals.

4- A study (Khalaf, Al-Khafaji, Al-Saidi, and Razzaq, 2022) entitled "**The Impact of Organizational Excellence on Innovation-Oriented Sustainability Practices (An Applied Study at the Dhi Qar Refinery)**".

-The study seeks to demonstrate the extent of the impact of organizational excellence on innovation-oriented sustainability practices in organizations.

-The study was conducted at the Dhi Qar Refinery on a random sample of (200) refinery employees. A questionnaire was used as the primary tool for data collection, consisting of two axes: the first: organizational excellence, and the second: innovation-oriented sustainability practices. The data were analyzed using the statistical programs AMOS and SPSS. The study reached several conclusions,

including that the company has a vision of sustainability oriented toward innovation practices, particularly in terms of developing new competencies that support green innovation within the company. The company also works to acquire environmentally friendly technologies and processes, continually seeking to enhance its green innovation skills in key areas where it lacks prior experience. The company continually explores new approaches to meet the expectations and requirements of key stakeholders. However, some of these areas require a better understanding of practices related to the use of new management systems to manage environmental innovation. Furthermore, the company's management often engages in a range of environmental innovation activities on an average basis, investing an appropriate proportion of research and development in them.

5 -A study (Al-Hamidi and Al-Mawri, 2022) entitled "**The Impact of Total Quality Management Dimensions on Improving Competitive Advantage: A Field Study of the Yemeni Telecommunications Company (Yemen Mobile)**" This study sought to investigate the impact of implementing Total Quality Management (TQM) dimensions on improving competitive advantage, represented by (improving profits and market share, ensuring the company's growth and sustainability), at the Yemeni Telecommunications Company (Yemen Mobile), operating in the city of Rada'a.

-The study relied on a descriptive analytical approach, with a questionnaire as the primary tool for data collection, divided into (30) paragraphs across five axes. The study population consisted of all employees at the Yemeni Telecommunications Company (Yemen Mobile). (38) questionnaires were distributed to a representative sample of the study population.

-After statistical analysis of the data, the study concluded that the company applies TQM dimensions to a moderate degree. The study also concluded that TQM dimensions have a positive impact on improving competitive advantage.

6 -A study by Al-Ghamdi, 2022, entitled "**Developing Administrative Performance in the Scholarships and University Relations Department at Al-Baha University in Light of the TQM Approach**".

- The study sought to identify the current state of administrative performance in the Scholarships and University Relations Department at the university and to present proposals for improving and developing performance in light of the TQM approach. The study used the descriptive-analytical approach, and a questionnaire was used as a tool for data collection. It consisted of (37) paragraphs distributed across three main dimensions: "the pre-scholarship stage, the stage during the scholarship, and the post-scholarship stage." The study population consisted of all teaching assistants and lecturers who were sent by the university to study the language or to obtain a scientific degree (master's, doctorate, fellowship), and who completed their scholarship and began their work at the university, or who were still on scholarship to obtain a higher scientific degree, provided they had completed a previous scientific degree. The study sample consisted of (394) individuals. The study reached a number of results, the most important of which are: The administrative performance of the employees of the Scholarships and University Relations Department at Al Baha University was weak from the point of view of the study sample. Their performance in the pre-scholarship stage came in first place with an average performance score, followed by their performance during the scholarship stage, which was weak, and finally, their performance in the post-scholarship stage was weak. The results of the study indicated the presence of statistically significant differences in the reality of administrative performance in the department attributed to gender differences, which were in favor of females, and to the difference in the qualification that the teaching assistant or lecturer was sent to obtain, which was in favor of the study sample members who were sent to obtain a qualification (language

or master's). While there are no statistically significant differences attributed to the type of mission, the country of sending, and the type of college.

7- A study (Al-Naimi, Al-Shoura, and Al-Tarawneh, 2022) entitled "**The Impact of Implementing Total Quality Management in the Smart Company: An Applied Study of Computer Information Systems Companies**".

-The current study sought to identify the impact of implementing Total Quality Management in the smart company on computer information systems companies. The study included a primary study of 39 computer information systems companies in Jordan. The importance of this study is evident in its connection between the elements of total quality in building and developing the smart company, which is the most important element for continuous integration, achieving continuous improvement, and building a competitive advantage that enables sustainability and rapid access to customers. The study aimed to demonstrate the impact of implementing total quality standards on achieving the smart company.

-Upon analyzing the data and testing the hypotheses, the study reached several conclusions, including: Smart organizations seeking to achieve a significant competitive advantage must instill these adjustments and changes in their roots so that they become deeply rooted in their building of solid foundations by incorporating all the technologies that enhance the foundations of modern management.

8 -A study (Muhammad, 2022) entitled "**The Role of Business Sustainability Dimensions in Promoting Social Responsibility** (A Survey Study at the General Company for the Manufacture of Medicines and Medical Supplies, Samarra, Iraq)".

-The study aimed to demonstrate the role of business sustainability dimensions in promoting social responsibility in the company under study (the General Company for the Manufacture of Medicines and Medical Supplies, Samarra, Iraq) by analyzing the content of the relationship and impact between the variables. A hypothetical

scheme was adopted, determined in light of a set of hypotheses, to answer the study's problem.

-A number of tools and methods were used to collect data and information, and the SPSS program was used (to measure the relationship and test the hypotheses).

The study demonstrated a significant positive correlation between the dimensions of business sustainability and enhancing social responsibility, with the overall correlation coefficient index reaching (85.0) at a significance level of (0.05). This demonstrates a strong correlation between the two variables. This means that the more the laboratory under study focuses on the combined dimensions of business sustainability, the more it contributes to enhancing the combined dimensions of social responsibility.

9 -A study by Hammad (2022) entitled "**Improving Engineering Safety Management in Construction Projects in Jordan**".

-The study aimed to measure methods for improving engineering safety management in construction projects in Jordan.

-The study followed a descriptive survey approach by preparing a questionnaire consisting of (30) items and distributing it to a sample of (147) engineers working in (36) engineering project offices.

- The results showed that new circumstances related to obstacles, which significantly impact safety, were observed, investigated, and discussed. A large number of workers on construction sites are uneducated and unskilled, with varying behaviors and beliefs based on safety requirements, unstable working conditions, and unstable employment practices. There is an increasing need for subcontractors, leading to unregulated selection, uncontrolled coordination, and unethical bid procurement practices.

Second: Foreign studies:

1- Study (Hanaysha, 2023) **Impact of Innovation Capabilities on Business Sustainability in Small and Medium Enterprises.**

–The rationale for this study was to investigate the impact of innovation types on business sustainability in small and medium-sized enterprises (SMEs). A quantitative approach was used to collect data and achieve the stated objective. Specifically, data was collected from 171 employees in SMEs in Saudi Arabia. Data collected was analyzed using the partial least squares (PLS–SEM) approach.

–The results showed that both product and service innovation have significant positive effects on business sustainability. The results further confirmed that process innovation is vital to achieving business sustainability. Finally, the results demonstrated that marketing innovation has a significant impact on business sustainability. The results confirmed the importance of innovation capabilities in helping SME entrepreneurs sustain their businesses and enhance their competitiveness.

2–(Nabila's study, 2022) **The Role of Organizational Culture on the Implementation of Total Quality Management: Case Study of the Algerian Cement Producer "Gica Group"**

–This study aims to analyze the role of human resource management (HRM) in implementing Total Quality Management (TQM), i.e., the impact of organizational culture on TQM implementation, primarily at the GICA Group.

–A descriptive and analytical approach was used, and statistical data were obtained using a survey method. A questionnaire was administered to a sample of 250 respondents.

–The study results confirmed the main hypothesis: the current organizational culture at the GICA Group impacts barriers to TQM implementation. Consequently, the study made several suggestions, including the following: organizing high-quality training courses for employees, demonstrating clear support for quality initiatives within the company, and adopting a more flexible cultural orientation.

3– Sahoo & Yadav(2022) **Total Quality Management in Indian Manufacturing SMEs**

–The study aims to examine the relationship between quality management dimensions and corporate performance, taking manufacturing SMEs as the focus of the research. Furthermore, the intention is to identify the main barriers to the adoption of quality management practices in manufacturing SMEs.

–Empirical data was extracted from a sample of 127 small and medium-sized manufacturing companies in India to address the research objective.

–The results supported the proposed hypothesis that TQM is positively related to manufacturing performance. The study recommended investigating the impact of TQM on company performance in several companies and comparing them with large manufacturing companies.

4– Study (Green, 2018) **Impact of JIT, TQM, and green supply chain practices on environmental sustainability.**

–The research aimed to empirically evaluate the complementary impact of JIT, TQM, and green supply chain practices on environmental performance.

–Data were analyzed using a PLS–SEM methodology, taken from a sample of 225 US manufacturing managers.

–The results showed that JIT and TQM are directly and positively related to green supply chain management practices. JIT, TQM, and green supply chain practices are complementary in that they collectively have a greater impact on environmental performance than when implemented individually. The study recommended practicing total quality management and a green supply chain

within the context of environmental sustainability, given their positive impact on the organization.

5- (Alghamdi Study, 2020) **Total quality management and organizational performance: A possible role of organizational culture.**

-Total Quality Management (TQM) has been identified as a key driver of organizational performance in public and private organizations. Organizational culture, along with TQM, was investigated to understand its contributions to organizational performance. The purpose of this study was to examine the relationship between TQM and organizational performance, taking into account the mediating effect of organizational culture.

-A total of 163 managers at various administrative levels in public organizations in Al-Baha Governorate participated.

-Pearson correlation analysis showed that the relationship between TQM and organizational performance was positive and statistically significant. Hierarchical regression analysis and structural equation modeling (SEM) showed that the interaction between TQM and organizational culture was statistically significant and positively related to organizational performance. Some recommendations and suggestions for future research are presented.

6- Study (ELnashar, 2020) **The Continuous Improvement for Business Sustainability & Corporate Governance to Expand Opportunities of International Finance**

-This study aims to develop an approach to predicting the impact of implementing and continuously improving business sustainability and corporate governance on contributions to society, the environment, and the economy, and thus on expanding opportunities for international finance.

-This paper contributes to measuring the initial outlook on outcomes from the perspective of business sustainability and corporate governance when implemented in the region (Egypt), by analyzing the responses of 15 practitioners in various companies in the region to a questionnaire that included 20 important questions related to the activation, implementation, and continuous improvement of business sustainability and corporate governance.

-The study reached consensus among the 15 practitioners, based on their agreement on the importance of this study based on descriptive statistical analysis. On the other hand, the results indicate that the impact of this paper's perspective on the objectives of community, environmental, and economic development to better expand international financing opportunities is unclear. Based on the results of the W census, the hypotheses indicate that the population is not equal, indicating significant variations in the responses of the fifteen practitioners, due to differences in their responses to the total sample of questions. The results of this paper provide empirical evidence that encourages future research to ensure the impact of the application, activation, and continuous improvement of business sustainability and corporate governance on community, environmental, and economic development, as well as on attracting international financing opportunities in the region (Egypt), with the aim of improving empirical contribution.

Theoretical Framework:

Total Quality Management

Total Quality Management (TQM) has become the cornerstone of the modern management model. It is one of the newest concepts in the administrative process and a focal point for most departments and organizations worldwide. Its goal is to improve performance, raise functional standards, reduce costs, and enhance profitability. Due to these advantages, TQM is one of the most important management models prevalent in the current era and has been highlighted by academic researchers (Ahmed, 2021).

TQM is based on the premise that every department, at all levels and with all its members, bears responsibility for the quality of work and contributes effectively to shaping the work environment in terms of ideas, future vision, oversight, and strategic direction, with the aim of enhancing performance efficiency. The primary goal of TQM is to make organizational culture the dominant culture within the company (Bayouda, 2020).

The Origin and Development of TQM:

TQM first emerged in Japan, where it called upon quality scientists and experts to support quality and improve operations. When quality management was implemented in Japan, it began to be applied in what are known as quality control circles (Al-Ghamdi, 2022). These departments aimed to hold weekly, organized employee meetings to discuss ways and means of improving work and identifying problems facing employees. After quality control departments were implemented in Japan in the 1960s, they spread to the United States in the following decade. In the 1980s, Total Quality Management (TQM) became a focus of attention for many organizations across Europe, and quality management has become a management function in the modern era (Bayouda, 2020).

Stages of the Development of the Concept of Total Quality Management

TQM has gone through several stages that have advanced it and led to its current status, as described by Toke and Kalpande.(2020)

- The Inspection Stage (1930-1940): In this stage, quality was defined as the process of examining activities related to measuring and selecting a product and checking its conformity to pre-established technical specifications.

- The Quality Control Stage (1940-1970): In this stage, quality was defined as all the statistical activities and methods that ensure product specifications are maintained. Statistical quality control also emerged.

- The Quality Assurance Phase (1970-1985): This method proved effective in the field of quality control. This period aimed to achieve a high level of quality and flawless productivity. This period required comprehensive oversight of all company activities, from the beginning of the first stage of production to the moment the product reaches the market.

- The Total Quality Management Phase (1985-present): This phase focuses on the quality of the product, free of defects and errors, and the quality of the activities through which the product is produced. It takes into account the principle of teamwork, and working as a team helps to leverage the expertise of employees and find solutions to the problems they face. Business organizations have become increasingly interested in Total Quality Management as a result of increased competition and to keep pace with technological advancements.

General Concepts of Quality Management

In recent years, the topic of quality management has received the attention of many academic researchers. The concept of quality has evolved from the added value of a product to the level of services provided to the customer, all the way to the level of performance. The term quality management has been accompanied by several

important concepts, including total quality management (TQM), which has become one of the most widespread concepts related to work quality and the development of its possible methods in all fields. It has become a basic requirement for many daily activities and practices in professional and administrative work (Toke & Kalpande, 2020).

All companies have achieved impressive results thanks to TQM, in terms of gaining market share and achieving complete customer satisfaction, due to providing services in the best possible way. The goal of TQM is to create radical positive changes for companies in order to achieve the desired level in terms of output quality and company survival (Al-Balushi, 2021).

The Concept of Quality

Quality is the fundamental basis for building many concepts of total quality. Therefore, the concepts and definitions of the term quality have varied according to the topic being addressed, the different perspectives on it, and the definitions that include the concept of quality. Bayouda (2020) defined it as the quality that meets needs and specifications, such as fulfilling requirements, being free of defects, and doing the work right the first time. It is also defined as meeting current and future business requirements and needs through continuous improvement of operations and activities and reducing costs (Al-Athry, 2021).

Baoush and Kamukh (2021) indicated that it is: "suitable for use, encompassing a complete and comprehensive approach to improving performance by building deep organizational cultures." The American Society defined it as the overall characteristics and qualities of services and goods provided, reflecting their ability to meet needs.

The Concept of Total Quality Management

The concept of Total Quality Management (TQM) is an integrated concept, as it is a modern management philosophy based on a number of innovative efforts and modern management methods. Many organizations have applied this concept to advance the development and improvement of services, gain customer satisfaction, and help address challenges (Ibrahim and Shaker, 2021). Among the definitions that address the concept of Total Quality Management are:

Rawas (2022) defined it as: "A management philosophy encompassing all company-related activities, through which the desires of customers and society can be met, and the company's expectations and goals achieved at the lowest cost." Khaitan (2022) defined it as the shared management practices and cultural revolution followed by management to improve quality. This helps management focus on processes and achieve the best results. The researcher believes that Total Quality Management (TQM) is a term that refers to the method of implementing activities and tasks that fall under management's responsibility, such as quality control for the services provided by the company. TQM is an administrative approach that includes numerous tasks and activities that require full commitment and a focus on quality performance with great effectiveness and in a shorter time, relying on evaluations of the extent of required developments.

The Importance of Total Quality Management

Quality is of paramount importance to the production process and to the individuals within the company, and its greatest importance accrues to the beneficiaries of the services provided to them. The implementation of Total Quality Management in companies has had many positive results for the company itself. In their study, Jalouli and Rahmon (2020) pointed out the importance and benefits achieved when organizations implement Total Quality Management, as follows:

- Reducing consumer, customer, and client complaints and increasing the quality of goods and services provided.

- Improving preventive methods and techniques leads to reducing quality costs and raising their level.
- Increasing the organization's market share.
- Increasing customer satisfaction due to reducing production defects and increasing product quality.
- Increasing efficiency, reducing inventory, reducing errors, and increasing innovation and improvements.
- Continuously examining all processes and eliminating any secondary activity in the production of goods and service delivery.
- Ensuring the project's need for development and improving performance measures.
- Developing teamwork to solve problems and improve processes.
- Continuously reviewing the progress of operations to develop a continuous improvement strategy.

The researcher believes that the importance of Total Quality Management stems from its comprehensive approach to change. It transcends being merely a procedural approach. Its importance is not only reflected in improving mutual relationships between producers, but also in raising and improving morale among employees, developing team spirit, and fostering a sense of pride when the company's reputation improves.

Goals of Total Quality Management

The goal of the Total Quality Management philosophy is to integrate organizational efforts to enable the company to gain the competitive advantage it seeks. This is achieved by continuously improving all components of the organization's organizational culture. Al-Athry (2021) mentioned in his study the most important goals of Total Quality Management, which are:

- Improving the performance of all employees by developing team spirit and collaborative teamwork skills, with the goal of the company benefiting from the full potential of its employees.
- Establishing the concepts of Total Quality Management, which are based on doing things right the first time and every time.
- Focusing on the performance of all managers and employees within the company through continuous monitoring, finding corrective solutions, and implementing sophisticated training and qualification programs, with a focus on quality across all activities and system components (inputs, processes, and outputs).
- Taking all preventive and corrective measures to avoid errors before they occur and enhance employee confidence in the quality levels achieved by the company.
- Increasing the efficiency and competitiveness of organizations, reflected in customer satisfaction and superiority over competitors.
- Increasing the productivity of all company elements and increasing their flexibility in dealing with variables, such as the ability to capitalize on opportunities and avoid and confront risks.
- Reducing the time required to complete customer tasks.
- Achieving quality by developing products and services according to customer desires.

Dimensions of Total Quality Management

The dimensions of Total Quality Management (TQM) form the foundation for the project's inception, as they represent the basic facts within the framework of practical application in all organizations. These principles are represented by:

1 -Leadership: This dimension is one of the most important principles and dimensions of TQM. This dimension refers to the administrative leadership within the company to implement TQM. In the absence of leadership, quality becomes merely a slogan with no impact on building quality programs. Quality begins and

stems from the leadership's commitment and gains effectiveness and power from the organization's senior management to create a revolution in change across all activities, operations, systems, work procedures, and employee relations, contributing to building quality management within the company (Abdul Mutalib and Al-Sakiti, 2021).

Researchers in the field of TQM agree that leadership within senior management plays a crucial role in adopting TQM. Many TQM pioneers have emphasized the importance of senior management's commitment to implementing TQM in organizations. Their work begins with setting goals and plans and gathering and allocating the necessary resources to implement TQM. It also oversees continuous improvement efforts to ensure oversight throughout the TQM adoption period, reviewing and evaluating the process with the aim of continuing its adoption (Detlefs, 2022).

2 -Continuous Improvement: This dimension is based on the TQM strategy and methodology, which seeks to introduce continuous improvements across all areas of the company's operations. This approach aims to continually adapt to changes occurring in the company's internal and external environment, particularly customer demands (Al-Hamidi and Al-Mawri, 2022). Obaid (2021) defined the concept of continuous improvement as the constant introduction of new and better things, whereby new and better things are considered a symbol of distinction, survival, and continuity. Al-Ghamdi (2021) views it as a management philosophy that aims to continually develop processes and activities related to machinery, individual materials, and production methods.

When an organization adopts TQM, it must implement continuous improvement processes across all its internal operations, as customer desires and needs change rapidly. The external factors surrounding the organization are constantly evolving over time, making it necessary to modify or change the organization's internal

processes to keep pace with external changes and to continue adopting Total Quality Management (TQM) (Saadi, 2016).

- 1- Customer Satisfaction: Customer satisfaction is achieved by studying the market, identifying its needs and customer desires, and then harnessing internal efforts to meet customer needs and measure their satisfaction. Therefore, TQM places customers and their satisfaction at the forefront of its concerns, and its goal is to achieve customer happiness. This requires focusing on processes that strive to achieve quality for the customer, whether internal or external, and thus raise the level of customer satisfaction. This is because a company's continuity and survival depend on customers, especially in light of the current intense global competition (Brata & Soediantono, 2022).
- 4- Employee Empowerment: Business organizations compete to obtain resources that enable them to continue. This is imposed on organizations due to openness and the constant environment of change and fluctuation. Competition extends to all aspects to obtain the best financial, informational, and technological resources with high efficiency and effectiveness in order to achieve the company's goals, achieve excellence, and meet the needs and desires of customers (Junglas, 2022).

2-

There are two approaches to empowerment in the business environment: the first is communicative, and the second is motivational. In empowerment literature, the communicative approach refers to a top-down process, and empowerment is most clearly demonstrated when higher levels participate with lower levels in the organizational structure. Therefore, empowerment includes many practices such as job enrichment, team autonomy, and self-management teams. The motivational communication approach focuses on employees' orientation toward empowerment, which manifests in competence and ability to perform tasks, influence work, and

freedom of choice in how tasks are chosen to be performed. Empowerment has several dimensions that provide a means of describing the empowering force employed within an organization: mission, mission definition, power, commitment, and culture (Abu Al-Fotouh, 2022).

Al-Otaibi (2020) defined employee empowerment as granting employees the authority to set their own work goals, make decisions related to resolving problems, and accomplish tasks that pose obstacles to achieving goals.

Employee empowerment was also defined as granting employees the authority to set work goals, making decision-making and problem-solving within the scope of their authority and responsibilities. This provides a complete picture of the company's philosophy through the company's vision, mission, and goals (Mortada, 2018).

Risk Management

Human interests and capabilities are growing due to widespread development and progress in all aspects of life. The risks resulting from the misuse of these developments and progress are increasing, necessitating the intensification of the use of the concept of risk management and the adoption of its ideas by individuals, organizations, and society, particularly service organizations (Al-Hajra, 2020). Given the multiplicity and diversity of risks facing most companies, many have resorted to adopting several methods to deal with new developments. The varying nature and type of risks has highlighted the importance of risk management, which aims to address the risks facing organizations through a set of stages and steps (Bahi, 2017).

The Origin of Risk Management

Risk management emerged in the early 1950s. It was covered in the Harvard Business Review in 1956. The objective of the publication was to define the principles of global risk management programs. Banks were among the first organizations to implement risk management. This concept subsequently expanded

and became used in all companies, particularly financial institutions (Ibrahim and Farqad, 2021). the philosophy of risk management seemed logical and reasonable, spreading from one company to another. The Society for Risk Management published a journal called Risk Management in 1975. In addition, the American Institute for risk developed educational programs in risk management, including a series of exams. Successful completion of the exams resulted in a certification in risk management. Graduates of the program now have the professional title of "Risk Management Fellow," as many concepts that emerged in academic classrooms have been transferred to the business world (Greuning & Brajovic-Bratanovic, 2022).

The Concept of Risk Management

Definitions of risk management have varied and overlapped, the most important of which are:

It is a set of scientific methods that must be taken into account when making decisions to address risks with the aim of reducing or preventing losses (Alabdullah, 2022). Hassan (2018) views it as a scientific approach to managing risks by anticipating potential losses and designing and implementing measures that minimize the likelihood of loss or the financial impact of any losses.

Ashour (2020) explained that it is the process of identifying, evaluating, managing, and monitoring potential events or conditions, the goal of which is to provide the company with reasonable assurance of achieving its stated objectives.

The researcher believes that the concept of risk management refers to a comprehensive and integrated system and approach for creating the appropriate environment and tools to anticipate and study potential risks. These risks are identified, their potential impact on the company's activities, including revenues and expenses, is measured, and an appropriate plan is developed to avoid or reduce risks, control them, and mitigate their effects.

Risk Management Objectives

In many studies, risk management objectives have been classified into two main groups: pre-loss risk management objectives and post-loss risk management objectives. These objectives will be explained in detail as follows:

First: Pre-loss risk management objectives

- Economy: This indicates that the company must prepare estimates of expected losses in an economical manner by analyzing program expenses and premiums, and reducing these expenses to the lowest possible level (Bahi, 2017).

- Anxiety reduction: When units are exposed to losses, this causes significant anxiety and fear for the risk manager. This may be due to the product's poor performance. The risk manager seeks to reduce this anxiety and fear associated with the units exposed to losses. This is the most complex of the risk management objectives (Lee, 2021).

- Fulfilling external obligations: The company must fulfill its obligations imposed on it by external parties, such as government requirements requiring the company to provide safety measures to protect workers from risks (Hassani, 2021).

Second: Objectives that coincide with the occurrence of a loss. These objectives, as stated in the Hasabou study (2022), include:

- Company survival: The company's survival and continuity require the restoration of a portion of its operations within a short period of time. The goal of risk management is to set a maximum cost limit for the project. If these costs increase, the project's survival is threatened.

- Continuity of operations: This means that the company continues its operations at full production capacity after a risk occurs, provided that the downtime is very short, so that the company does not lose any of its customers or suppliers or its competitiveness is reduced.

-Stable returns: This occurs when the company wants to retain the profits it has generated from shares. In the event of a loss, the company resorts to limiting the decline in cash flows to acceptable limits.

-Continued growth: The company can continue to grow and prosper by developing new services or products, opening new markets, or through acquisitions and mergers with other companies. The company can also ensure its continuity by maintaining its supply sources in the event of a risk. - Social Responsibility: A company can fulfill its social obligations by reducing the impact of losses on individuals and society. These losses have negative repercussions for employees, customers, suppliers, creditors, taxpayers, and all segments of society in general.

The objectives and concepts of risk management are based on several scientific methods that must be taken into account when making decisions to address any type of risk, to reduce or prevent losses, and to limit uncertainty. The foundation of risk management is primarily based on minimizing the costs associated with risk, such as opportunity costs, the costs of material losses associated with the risk, moral costs, and the actual loss incurred due to the occurrence of the risk.

Business Sustainability

Business sustainability is one of the most important management fields, receiving special attention from organizations focused on long-term survival (Al-Hadrawi and Al-Dhabawi, 2020). Sustainability depends on the internal and external characteristics of a company, and these characteristics must be compatible with each other in order to maintain a cohesive organization. Therefore, business sustainability is a fundamental concept for many researchers and practitioners in the field of business management to ensure the safety and survival of the company (Al-Taie, 2018).

The concept of sustainability has received significant attention in recent years due to the ambiguity surrounding how companies can be sustainable and how to best achieve this, given its connection to numerous variables (Al-Sharif, 2021). Some companies support their sustainability through management information systems, as companies striving to achieve sustainability possess the ability to innovate and differentiate themselves compared to competitors. Innovation gives companies a significant opportunity in the long run (Juba and Badie, 2018). When a company achieves sustainability, it can add new value to its business. By seizing opportunities and reducing risks, sustainability also contributes to meeting customer needs. Therefore, it has become a key strategic focus for organizations seeking sustainable survival in a highly competitive market (Al-Nakhili and Muhammad, 2022).

The Concept of Sustainability

In the early 1980s, the concept of sustainability was associated with the human element. Its goal was to ensure the continued survival of the human species on Earth. Later, this concept became a general concept encompassing all aspects of life (Daghim, 2020). The expansion of the concept of sustainability was a result of awareness of the disasters surrounding humanity. The threat was not limited to humans alone, but also extended to the environment and natural resources. From this, the concept of sustainability arose, which primarily works to sustain all resources that are vulnerable to depletion. The process of extending life expectancy can only be achieved by linking the present to the future and ensuring that the needs of future generations are met (Dhaifallah, 2020).

Al-Taie (2018) defined sustainability as the study of how natural systems function, diversify, and produce everything the natural environment needs to maintain balance. Al-Dulaimi (2018) views it as providing future generations with opportunities equal to or greater than those provided to current generations. Al-Nakhili and Muhammad (2022) view it as the management and conservation of the

resource base and the direction of biological and institutional change in a manner that ensures the continuous satisfaction of human needs for present and future generations across all economic sectors. This approach prevents environmental degradation, which is characterized by technicality and acceptance.

Main Goals of Sustainability

In 2012, the United Nations held a conference on sustainable development to discuss and develop several goals that must be achieved in line with the third Millennium Development Goals. The most important goal calls for success in reducing global poverty, while at the same time considering that there is more to be done. Al-Dulaimi's (2018) study listed the most important goals of sustainability, which are:

- Ending the suffering of poverty and hunger.
- Setting better standards for education and health. - Higher water quality and sanitation.
- Achieving social equality.
- Sustainable economic development, job creation, and strong economies.
- Combating climate change, pollution, and all other health-damaging factors.
- Sustainability, including the health of the land, air, and sea.

The Concept of Business Sustainability

The concept of sustainability has spread worldwide through the Common Future report prepared by the United Nations Commission on Environment and Development (Mohammed, 2019). It demonstrated that sustainability relates to social and environmental justice and is also linked to the economic prosperity of organizations. This was achieved by coining the term sustainable development, which is linked to meeting the needs of the present without compromising the ability of future generations to meet their own needs. The concept of sustainability evolved in the mid-1990s as a means for business organizations to manage and balance their

production efforts with the demands of the environment and the local community (Jumah, 2022).

Nakhla and Masoud (2022) defined it as everything that can be preserved within a company. It is defined as institutional activities that proactively seek to contribute to achieving sustainable balance across all economic, environmental, and social aspects in the short, medium, and long term through the company's activities, which include operations, production, and strategic management (Menne, 2022). It has also been defined as a method for achieving growth that takes into account the human aspect in all its dimensions (Mortada, 2018).

The Importance of Business Sustainability

The importance of companies adopting business sustainability lies in many reasons, including the importance of non-renewable resources such as energy and water. The global economic crisis that occurred a few years ago raised questions about the viability of current business practices that aim to achieve economic growth without regard for reducing the impact of activities on the external environment (Al-Masry, 2016).

Over time, organizations that do not address sustainability will become disadvantaged in their competitive position. Therefore, business organizations recognize that sustainability plays a significant role in generating future growth, which in turn leads to ensuring economic gains, stimulating innovation, and reducing the company's impact on the environment. When a company implements sustainability practices, its competitive position and the quality of its products will improve, as will the efficiency and effectiveness of supply chain management, thereby reaping numerous long-term benefits. Therefore, companies must integrate sustainability into all their practices. They must focus on issues that contribute to making working conditions and corporate culture supportive of sustainability and reducing its environmental impacts (Nakhla and Masoud, 2022).

Dimensions of Business Sustainability

Business sustainability encompasses several integrated and interconnected dimensions. They are viewed as complementary, not separate. Researchers have agreed to clarify the concept of sustainability and address it through the economic, social, and environmental dimensions.

1 -Economic Sustainability: Business sustainability is defined as the impact of companies on the economic conditions of stakeholders and on the national and global economic system, which is reflected in society and the flow of resources among all stakeholders. Profits are among the results of financial operations, and are presented in the form of annual or semi-annual reports that serve as an important tool for understanding the company and its financial operations (Nakhla and Masoud, 2022).

Economic sustainability requires a company to manage several types of economic capital, including: financial capital (debt and equity), fixed capital (land and machinery), and intangible capital (goodwill and patents). To achieve economic sustainability, a company must conduct its activities in a recognized manner while delivering economic and social benefits to its stakeholders (Ruggerio, 2021). Sustainability, as stated in Labib's study (2021), is defined, according to the economic dimension, as the protection, provision, and guarantee of productive capacities from one generation to the next. Through this, any society can achieve continuous development, whether from a technical perspective or in terms of its ability to ensure increasing income levels from one generation to the next. The economic dimension focuses on the long- and short-term value generated by an organization, which is linked to business sustainability and is measured based on economic wealth and the equal advancement of both social and environmental sustainability.

Economic Sustainability Assessment Approaches

There are two approaches to economic sustainability, as outlined in a study by Gyamfi:(2022)

- The first approach: This begins by asking how a business can continue and survive. This approach is called the internal assessment approach.

- The second approach: This approach examines the economic impact of the company on the economic system and stakeholders as a whole, and examines how the external environment affects the sustainability of the business organization. This includes the economic impact on anything that creates job opportunities, produces public goods, supplies the supply chain, and employee benefits.

- Social Sustainability: This approach reflects the company's awareness of its responsibility for its actions and its genuine and reliable long-term commitment to all business activities in order to successfully remain in the market for a long period of time. Social sustainability aims to positively impact all current and future relationships with stakeholders by focusing on meeting their needs to enhance loyalty to the organization (Alam, 2020). Social sustainability encompasses concepts such as equality, empowerment, accessibility, participation, strengthening identity, and organizational stability. Social sustainability also encompasses issues related to human development, such as education and training, occupational health and safety in the workplace, capacity building, equal pay and benefits, equal opportunity, and the absence of discrimination in the workplace, as well as ethical considerations such as employee rights, culture, values, and fairness for all (Nakhla and Masoud, 2022). Recently, interest in the social sustainability of organizations has increased, with increased focus on the social role that the company must play toward society and within the workplace. Opinions have varied regarding its obligation. The importance of social responsibility is highlighted, as stated by Mahsab (2021) in his study:

- Social stability due to the availability of a degree of social justice and the prevalence of the principle of equal opportunity, which is the essence of the social responsibility of economic units.

- Improving political development as a result of increased education and social awareness at the individual, group, and unit levels, which is reflected in individuals' sense of social justice.

- Increasing awareness of the importance of full integration between organizations and stakeholder groups.

Social Sustainability Goals:

One of the most important goals of social sustainability is enhancing the organization's reputation and brand, which increases the degree of satisfaction among stakeholders when they listen to the opinions of the public and society as a whole. Among the most important goals of social sustainability, as stated by Kamel :(2022)

- Improving the company's reputation, which is built on the foundation of efficiency and success in providing services, mutual trust between organizations and stakeholders, and the level of transparency with which these organizations deal and to which they are involved. The extent to which environmental and investment considerations are taken into account in human capital.

- Providing information about the company's activities relative to the surrounding environment, such that they preserve the environment surrounding the project and protect it from the harmful effects of pollution caused by the project itself.

Social responsibility is one of the most important aspects that organizations agree to consider in terms of social and environmental concerns when managing their relationships with stakeholders and objectives. The goal is to satisfy desires and meet needs. The objectives of social responsibility converge with the fundamental objectives of business sustainability. Social sustainability is achieved when the

necessary resources are available to meet the needs of future generations in terms of educational opportunities, health services, and an acceptable standard of living that avoids the limits and rates of poverty. Social sustainability refers to the status of human beings in terms of their ability to grow and develop through equality of income and wealth, and to confront unemployment and high crime rates. Consequently, the lack of security leads to environmental destruction (Labib, 2021).

3- Environmental Sustainability

Refers to the long-term preservation of all practices and factors that contribute to environmental quality. Environmental sustainability encompasses ecosystems and biodiversity. Environmental sustainability requires the preservation of natural capital as a source of economic inputs. It also includes the environmental impacts resulting from a company's activities, such as the effects of resource use, gases emitted into the air, water, or land, as well as hazardous waste, biodiversity impacts, and environmental issues throughout the product life cycle (Jabba and Badie, 2018). Every natural system has limits that are difficult to cross in terms of exploitation, and overexploitation leads to ecosystem degradation. The only way to protect the ecosystem is to limit unsustainable production and consumption patterns, such as depleting groundwater and surface water and deforestation. Environmental sustainability means protecting natural resources from human pressures. Environmental indicators address a company's impact on the living and non-living natural system, which includes land, air, and water. These indicators help vital ecosystems identify the most significant environmental impacts and link environmental objectives to employee development.

Engineering Project Companies in Saudi Arabia

Engineering offices represent the backbone of the construction sector in the Kingdom of Saudi Arabia. They are not merely entities that provide designs and plans, but have become strategic partners in managing engineering projects at all stages. With the rapid development witnessed by the Kingdom under Vision 2030 and the accompanying mega-projects, the importance of engineering offices has increased, as has their pivotal role in achieving the objectives of these projects and ensuring their implementation according to the highest international standards (Economic Indicator for the Engineering Sector in Saudi Arabia, 2024).

Engineering offices in the Kingdom have witnessed significant development over the past decades, moving from merely providing traditional engineering services such as architectural and structural design to playing an integrated role in managing all aspects of engineering projects. The emergence of engineering project offices in Saudi Arabia is linked to the emergence of the Saudi Council of Engineers and the development of the concept of project management. The idea began with discussions about regulating the engineering sector. The Engineering Advisory Committee was then formed by ministerial decision in 1982. In 2003, the Council of Ministers approved the Saudi Council of Engineers project, marking an important step in regulating and institutionalizing engineering offices (Saudi Council of Engineers, 2024). Project management, including project management offices, evolved in tandem with the growth of the engineering and construction industries and subsequently became more prevalent in the information technology sector. There are hundreds of licensed engineering offices and companies in Saudi Arabia, including branches, operating in various engineering disciplines. Engineering offices in Saudi Arabia began as simple design offices during the oil boom of the 1970s, and then underwent a gradual development, summarized by Samani and Ammari (2023) as follows:

- 1 .Establishment phase: Focused on simple architectural and structural designs.
- 2 .Growth phase: Expanded to include implementation supervision services.
- 3 .Development phase: Added project management and specialized consulting services.
- 4 .Current phase: Offering integrated solutions for managing engineering projects from concept to delivery. Engineering offices provide a range of services covering all phases of an engineering project, including, as Abdullah (2023) pointed out:
 - 1 -Feasibility Studies and Initial Planning: Engineering offices help developers make informed decisions before investing their money by:
 - Conducting technical and economic feasibility studies for projects
 - Evaluating the site and analyzing its topographical and geotechnical characteristics
 - Studying the regulatory and legal requirements for the project
 - Analyzing potential risks and developing strategies to manage them
 - 2 -Integrated Project Design: Engineering offices' services are not limited to architectural design alone, but also include:
 - Architectural design that combines aesthetics with functionality
 - Structural design that ensures the safety and stability of the building
 - Electrical, mechanical, and plumbing systems design
 - Air conditioning and ventilation systems design
 - Firefighting and safety systems design
 - Interior design and space coordination
 - 3 -Managing Licensing and Approval Processes: Engineering offices are responsible for obtaining the necessary licenses and approvals from the relevant authorities:
 - Preparing licensing files according to the requirements of municipalities and secretariats
 - Following up on building permit procedures
 - Coordinating with government agencies to obtain various approvals

- Amending plans based on the observations of regulatory authorities
- Following up on excavation and construction permits and connection to public services

4 -Supervising Implementation and Quality Control: Engineering offices play a pivotal role in the implementation phase through:

- Daily supervision of construction work
- Ensuring that work is carried out according to approved plans
- Monitoring the quality of materials used and ensuring their compliance with specifications
- Inspecting and approving material samples before use
- Conducting the necessary tests to ensure quality of implementation
- Issuing periodic reports on work progress and completion rates

Professional engineering offices are distinguished by their ability to manage risks through several factors highlighted by Samani and Ammari:(2023)

- 1 -Identifying potential risks in the early stages of the project
- 2 -Developing alternative plans to address potential problems
- 3 -Continuous risk assessment throughout the project
- 4 -Predicting future problems and taking appropriate action Preventive
- 5 -Rapid and Effective Response to Emergency Problems

Despite the pivotal role engineering offices play in the success of projects, they face several challenges, as outlined by Samani and Ammari:(2023)

-Regulatory and Legal Challenges: Engineering offices deal with a constantly changing regulatory environment:

- 1 -Multiple regulatory bodies and overlapping jurisdictions
- 2 -Continuous changes in regulations and laws
- 3 -Complexity of procedures for obtaining licenses and approvals
- 4 -Different requirements from one region to another

5 -Continuous qualification and classification requirements

-Technical and Technological Challenges: Engineering offices face emerging technical challenges:

- 1 -Keeping pace with rapid developments in construction technologies
- 2 -Providing qualified personnel to handle modern technologies
- 3 -Integrating various systems and software
- 4 -Ensuring the security of information and digital data
- 5 -Meeting the growing demands for energy efficiency and sustainability

-Administrative and Financial Challenges: Engineering offices deal with numerous administrative and financial challenges:

- 1 -Managing cash flows in the face of delayed payments
- 2 -Intense competition and price pressure
- 3 -Managing human resources and attracting new talent Competencies
- 4 -Pressures of ambitious timelines
- 5 -Dealing with scope changes during implementation

Successful engineering firms adopt innovative strategies to overcome challenges, as highlighted by the Saudi Council of Engineers:(2024)

- 1 -Investing in continuous training and professional development
- 2 -Building strategic partnerships with specialized engineering firms
- 3 -Adopting flexible business models that respond to changes
- 4 -Specializing in specific sectors to build deep expertise
- 5- Developing innovative solutions that set them apart from competitors

Chapter Three

Methodology and Procedures

Study Methodology

Based on the current research problem, objectives, and questions, the researcher adopted a descriptive correlational approach, which is appropriate to the nature and objectives of the study. This approach aims to identify the level of application of Total Quality Management (TQM) in achieving business sustainability and its relationship to risk management in engineering project companies in Saudi Arabia.

Study Population and Sample:

The study population consisted of (500) senior managers and engineers in engineering project companies in Riyadh, Saudi Arabia. (400) questionnaires were distributed, of which (260) were returned, and (26) were excluded due to incomplete information. Thus, the number of questionnaires valid for analysis was (234), representing (58.5%) of the total distributed questionnaires.

Study Tools

The study tool is the method used by the researcher to collect the necessary information about the phenomenon under study. There are many tools used in the field of scientific research to obtain the information and data necessary for the study. This research relied on developing a questionnaire by reviewing numerous studies related to the research topic, in addition to reviewing previous studies, such as the study by Al-Ghamdi (2021) and the study by Al-Naimi, Al-Shoura, and Al-Tarawneh (2020), to benefit from them in developing the data collection tool. For the purposes of the study, the researcher prepared three questionnaires. The first aimed to measure the level of implementation of Total Quality Management (TQM) in engineering project companies in Saudi Arabia. It consisted of five domains:

The first domain: Leadership, which included (5) items.

The second domain: Continuous Improvement, which included (5) items.

The third domain: Customer Satisfaction, which included (5) items.

The fourth domain: Work Team, which included (5) items.

The fifth domain: Employee Empowerment, which included (4) items.

The second tool aimed to measure the level of business sustainability implementation in engineering project companies. It comprised (16) items distributed across three areas:

The first area: Economic sustainability, which included (6) items.

The second area: Social sustainability, which included (4) items.

The third area: Environmental sustainability, which included (4) items.

The third tool aimed to determine the level of risk management in engineering project companies and included (9) items.

Validity of the Study Tools

To ensure the validity of the tools, they were presented to a number of experienced and specialized faculty members in the fields of business administration and engineering at Saudi universities. They assessed the accuracy of each statement, the extent to which the items fit the axis they measure, the clarity of the items, the degree of importance, and the correctness of expression and linguistic structures. The researcher accepted their suggestions and made necessary amendments to the items related to the study areas, such as modifying some items and deleting others from the questionnaire. The total quality management questionnaire had (28) items before arbitration. Two items were merged and two items were deleted due to duplication, leaving (24) items after arbitration. The business sustainability questionnaire had (16) items before arbitration. The wording of some items was modified, and some linguistic and typographical adjustments were made, leaving (16) items. The risk management questionnaire had (11) items before arbitration, and two items were deleted due to duplication, leaving the tool with (9) items.

Study Tool Correction Procedures:

The researcher relied on a five-point Likert scale to determine the level of implementation of Total Quality Management (TQM), business sustainability, and their relationship to the level of risk management in engineering project companies, as follows: Strongly agree (5), agree (4), neutral (3), disagree (2), and strongly disagree (1). The following scale was adopted to assess the arithmetic means of the items: (1-2.23: low), (2.34-3.67: medium), and (3.68-5: high), based on the following equation: Where the class length was calculated by

$$1.33 = \frac{1-5}{3} = \frac{\text{lowest degree} - \text{highest degree}}{3}$$

Stability of study tools

Cronbach's alpha was used to determine the internal consistency coefficient of the study tools, as shown in Table.(1)

Table(1)

Values of internal consistency coefficients (Cronbach's alpha) for the study tools

Reliability coefficient Cronbach's alpha	N	field	N
0.671	5	Leadership	1
0.789	5	Continuous Improvement	2
0.898	5	Customer Satisfaction	3
0.837	5	Teamwork	4

0.929	4	Employee Empowerment	5
0.950	24	Total Quality Management	
0.876	6	Economic Sustainability	1
0.937	4	Social Sustainability	2
0.950	4	Environmental Sustainability	3
0.980	16	Business sustainability as	
0.879	9	Risk management as a	1

Statistical processing

The Statistical Package for Social Sciences (SPSS) was used to analyze the study data, arrive at the study's results, achieve its objectives, and answer its questions.

The following statistical methods were used:

- Cronbach's alpha coefficient was used to verify the reliability of the study tool.
- Frequencies, arithmetic means, and standard deviations were used to answer the first, second, and third questions.
- Pearson's correlation coefficient was used to answer the fourth and fifth questions.

Chapter Four

Data Analysis and Hypothesis Testing

Introduction:

Chapter Four of the study discusses the results of the study sample members' responses, tests its hypotheses, and analyzes the data collected to provide a true picture of the causal correlation between the application of Total Quality Management (TQM) and business sustainability on risk management in engineering project companies. It also reviews the results of the hypothesis testing, which were reached through the application of appropriate statistical

Description of the Study's Dimensions and Variables

This section of the study presents a description of the study's dimensions and variables by analyzing the study sample members' responses to the items designated to measure them in the study instrument. To achieve this, descriptive statistical methods were used, including arithmetic means and standard deviations, in addition to rank and relative importance. The following is a description of the study's variables and their sub-dimensions.

First: Description of the Total Quality Management (TQM) variable and its sub-dimensions (Results of the first question)

The Total Quality Management (TQM) variable represents the independent variable in the study and includes (5) sub-dimensions. The following is a description of this variable and its sub-dimensions.

Leadership

Table (2) Descriptive statistical measures for the dimension (Leadership)

relative importance	Rank	standard deviation	mean	Paragraph	N
High	3	1.29	3.80	The company's management believes that Total Quality Management (TQM) is the optimal approach to sustaining its business.	1
High	1	1.12	4.03	The company's management has set clear and specific quality objectives.	2
High	4	1.19	3.78	The company's management provides the infrastructure for implementing quality.	3
High	2	1.21	4.02	The company's management embeds a culture of quality at all levels.	4
High	5	1.21	3.77	The company's management has a clear vision that embodies its philosophy toward TQM.	5
High			3.88	General scale	

Table No. (2) shows that the level of relative importance of the dimension (leadership) was high, as the general arithmetic mean reached (3.88). Paragraph (2) (the company's management set clear and specific goals for quality) ranked first with an arithmetic mean of (4.03) and a high relative importance, while paragraph (5) (the company's management has a clear vision that embodies its philosophy towards total quality management) ranked last with an arithmetic mean of (3.77) and a high relative importance.

Continuous Improvement

Table (3) Descriptive statistical measures for the dimension (continuous improvement)

relative importance	Rank	standard deviation	mean	Paragraph	N
High	1	1.18	3.97	The company is committed to continuously improving the quality of its services.	1
High	3	1.24	3.86	The company adopts and utilizes the latest technology in the field of engineering projects.	2
High	5	1.49	3.24	The company continuously reviews policies and procedures.	3
High	2	1.28	3.96	The company continually updates its operations.	4
High	4	1.27	3.84	The company utilizes customer suggestions for continuous improvement.	5
High			3.77	General scale	

Table No. (3) shows that the level of relative importance of the dimension (continuous improvement) was high, as the general arithmetic mean reached (3.77). Paragraph (1) (the company is keen to continuously improve the quality of its services) ranked first with an arithmetic mean of (3.97) and a high relative importance, while paragraph (3) (the company continuously reviews policies and procedures) ranked last with an arithmetic mean of (3.24) and a medium relative importance.

Customer Satisfaction

Table (4) Descriptive statistical measures for the dimension (customer satisfaction)

relative importance	Rank	standard deviation	mean	Paragraph	N
High	3	1.24	3.96	The company considers customer satisfaction its top priority.	1
Medium	5	1.53	3.22	The company considers customer satisfaction a necessary requirement for the sustainability of its business.	2
High	1	1.22	4.00	The company collects information related to customer complaints and suggestions.	3
High	2	1.32	3.99	The company works to quickly resolve customer issues.	4
Medium	4	1.29	3.66	The company monitors, evaluates, and analyzes customer satisfaction with the services provided.	5
High			3.76	General scale	

Table No. (4) shows that the level of relative importance of the dimension (customer satisfaction) was high, as the overall arithmetic mean was (3.76). Paragraph (3) (the company collects information related to customer complaints and suggestions) ranked first with an arithmetic mean of (4.00) and a high relative importance, while paragraph (2) (the company considers customer satisfaction a necessary requirement for the sustainability of its business) ranked last with an arithmetic mean of (3.22) and a medium relative importance.

Work Team

Table (5) Descriptive statistical measures for the dimension (work team)

relative importance	Rank	standard deviation	mean	Paragraph	N
High	3	1.35	3.74	The company encourages employees to work as a team.	1
High	4	1.24	3.69	The company provides opportunities for training and development of its staff on quality systems.	2
High	1	1.25	3.90	The company delegates sufficient authority to its work teams to accomplish their tasks.	3
High	2	1.22	3.76	The work teams contribute to finding solutions to work-related problems within the company.	4
High	5	1.28	3.67	The company adopts a team approach at all levels of management.	5
High			3.75	General scale	

Table No. (5) shows that the level of relative importance of the dimension (work team) was high, as the general arithmetic mean was (3.75). Paragraph (3) (the company delegates to work teams sufficient powers to accomplish their tasks) ranked first with an arithmetic mean of (3.90) and a high relative importance, while paragraph (5) (the company adopts the work team approach at all its administrative levels) ranked last with an arithmetic mean of (3.67) and a high relative importance.

Employee Empowerment

Table (6) Descriptive statistical measures for the dimension (employee empowerment)

relative importance	Rank	standard deviation	mean	Paragraph	N
Medium	3	1.38	3.47	The company encourages employees to put forward ideas and gives them space to express their opinions.	1
Medium	4	1.51	3.28	The company involves employees in decision-making processes.	2
High	1	1.23	4.02	The company motivates employees to solve problems they encounter in the field.	3
Medium	2	1.25	3.66	The company grants employees sufficient authority to complete the required tasks in the field.	4
Medium			3.61	General scale	

Table No. (6) shows that the level of relative importance of the dimension (employee empowerment) was average, with a general arithmetic mean of (3.61). Paragraph (3) (the company motivates employees to solve the problems they face at work) ranked first with an arithmetic mean of (4.02) and a high relative importance, while paragraph (2) (the company involves employees in decision-making processes) ranked last with an arithmetic mean of (3.28) and a medium relative importance.

Second: Description of the dependent variable (business sustainability) (results of the second question)

The business sustainability variable represents the dependent variable in the study, and includes (3) sub-dimensions. The following is a description of this variable and its sub-dimensions.

First: Economic Sustainability

Table (7) Descriptive statistical measures for the (Economic Sustainability) items

relative importance	Rank	standard deviation	mean	Paragraph	N
High	5	1.09	3.94	The company is committed to providing its services at the lowest possible cost.	1
High	6	1.18	3.79	The company makes optimal use of its available resources.	2
High	3	1.21	4.06	The company is committed to providing its services in the best possible way within its available resources.	3
High	2	1.19	4.08	The company aims to provide added value to customers.	4
High	1	1.23	4.23	The company's organizational position is more stable, competitive, and sustainable as a result of the success of its operations.	5
High	4	1.28	4.02	The company's economic activities and programs contribute to achieving community well-being.	6
High			4.02	General scale	

Table No. (7) shows that the level of relative importance of the variable (economic sustainability) was high, as the general arithmetic mean reached (4.02). Paragraph (5) (the company's organizational status is more stable, competitive and sustainable

as a result of the success of its operations) ranked first with an arithmetic meaning of (4.23) and a high relative importance, while paragraph (2) (the company exploits its available optimal resources) ranked last with an arithmetic meaning of (3.79) and a high relative importance.

Second: Social Sustainability

Table (8) Descriptive statistical measures for the (Social Sustainability) items

relative importance	Rank	standard deviation	mean	Paragraph	N
Medium	4	1.44	2.87	The company provides various social services to the community.	1
Medium	2	1.25	3.27	The company's plans include goals related to social responsibility.	2
Medium	3	1.28	3.00	The company provides sponsorship programs for talented employees involved in the implementation of its engineering projects.	3
Medium	1	1.20	3.57	The company is working to improve its community image.	4
Medium			3.18	General scale	

It is clear from Table No. (8) that the level of relative importance of the variable (social sustainability) was medium, as the general arithmetic mean was (3.18). Paragraph (4) (the company is working to improve its societal image) ranked first with an arithmetic mean of (3.57) and a medium relative importance, while paragraph (1) (the company provides multiple social services to the community) ranked last with an arithmetic mean of (2.87) and a medium relative importance.

Third: Environmental Sustainability

Table (9) Descriptive statistical measures for the (Environmental Sustainability) items

relative importance	Rank	standard deviation	mean	Paragraph	N
High	4	1.30	3.85	The company sponsors environmental awareness campaigns.	1
High	2	1.17	3.98	The company complies with government environmental legislation.	2
High	1	1.11	4.07	The company uses technology that contributes to providing environmentally friendly services during the implementation of its engineering projects.	3
High	3	1.13	3.91	The company works to reduce the consumption of energy, paper, and other resources in its engineering projects.	4
High			3.95	General scale	

It is clear from Table No. (9) that the level of relative importance of the variable (environmental sustainability) was high, as the general arithmetic mean reached (3.95). Paragraph (3) (the company uses technology that contributes to providing environmentally friendly services during the implementation of its engineering projects) ranked first with an arithmetic mean of (4.07) and a high relative importance, while paragraph (1) (the company adopts environmental awareness campaigns) ranked last with an arithmetic mean of (3.85) and a high relative importance.

Third: Description of the Risk Management Variable (Results of Question Three) The following describes this variable:

Table (10) Descriptive Statistics Measures for the Risk Management Variable

relative importance	Rank	standard deviation	mean	Paragraph	N
High	2	1.10	3.98	Improving auditing and quantity surveying skills	1
High	3	1.16	3.95	Reducing fraud and deception	2
High	6	1.22	3.87	Improving the performance of engineering project supervisors and reducing subjective judgment and assessment, thus reducing the rate of audit error.	3
High	5	1.25	3.90	Solving problems facing unqualified workers	4
High	7	1.22	3.76	Resolving the problem of unexpected funding cuts	5
High	8	1.28	3.67	Ensuring adherence to professional standards and organizing workflows.	6
High	1	1.11	4.07	Developing successful plans that meet the future missions of engineering project companies	7
High	4	1.13	3.91	Reducing the possibility of errors in engineering design	8
High	3	1.16	3.95	Enables reconsideration of judgments regarding the integrity of the engineering project's internal control.	9
High			3.89	General scale	

It is clear from Table No. (10) that the level of relative importance of the dimension (risk management) was high, as the general arithmetic mean was (3.89). Paragraph (7) (developing successful plans that meet the future tasks of engineering project companies) ranked first with an arithmetic mean of (4.07) and a high relative importance, while paragraph (6) (emphasizing commitment to

professional standards and organizing workflow) ranked last with an arithmetic mean of (3.67) and a high relative importance.

Hypothesis Testing Results:

Results related to the first opportunity (results of the fourth question):

To confirm the existence of a correlation between the application of total quality management and risk management in engineering project companies, the correlation coefficient between them was calculated using Pearson's correlation coefficient. The results are as shown in Table.(11)

Table(11)

Results of Pearson's correlation coefficient between the application of total quality management and risk management in engineering project companies.

Risk management		variable
0.069	Pearson's Correlation Coefficient	Total Quality Management Application
0.378	Significance Level	
234	Number of Responses	

The previous table shows that the correlation coefficient value reached (0.069) and the calculated significance level value reached (0.378). Therefore, we conclude that there is a statistically significant correlation, such that a higher level of TQM implementation in engineering project companies leads to an increase in the quality of risk management.

Results related to the second opportunity (results of the fifth question):

To confirm the existence of a correlation between the application of business sustainability and risk management in engineering project companies, the correlation

coefficient between them was calculated using Pearson's correlation coefficient. The results are as shown in Table (12).

Table(12)

Pearson's correlation coefficient results between the application of business sustainability to risk management in engineering project companies.

Risk management		variable
0.074	Pearson's Correlation Coefficient	Business Sustainability Application
0.289	Significance Level	
234	Number of Responses	

It is clear from the previous table that the value of the correlation coefficient reached (0.074) and the value of the calculated significance level reached (0.289). Therefore, we conclude that there is a statistically significant correlation, such that the high level of application of business sustainability in engineering project companies leads to an increase in the level of quality of risk management.

Chapter Five

Discussion of Results and Recommendations

Introduction:

This chapter presents a discussion of the most important findings related to the field study and appropriate recommendations to address weaknesses, if any.

First: Results related to the first question:

-The relative importance level of the field of Total Quality Management (TQM) in its dimensions (leadership, continuous improvement, customer satisfaction, teamwork, and employee empowerment) ranged between high and medium. This indicates the study sample's awareness of the importance of TQM in reducing consumer and customer complaints, improving the quality of services provided to them, and improving preventive methods and techniques, which has reduced quality costs and raised its level, and increased the market share of engineering project companies in Saudi Arabia. This result is consistent with the study by Al-Ahmari and Abdul Qader.(2024)

Second: Results related to the second question:

-The relative importance level of the field of business sustainability, with its dimensions (economic sustainability, social sustainability, and environmental sustainability), ranged between high and medium. This indicates the study sample's awareness of the importance of business sustainability, as it helps engineering project companies in Saudi Arabia generate creativity by encouraging inquiry and learning among employees, reducing administrative risks, and decreasing labor costs. This result is consistent with the study by Khalaf, Al-Khafaji, Al-Saidi, and Razzaq (2022), which concluded that the company under study has a vision of sustainability directed toward innovation practices regarding the development of new competencies that support green innovation within the company.

Third: Results related to the third question:

-The relative importance level of the dimension (risk management) was high. This indicates the study sample's awareness of the importance of risk management in confronting risks with the aim of reducing or preventing losses, thus reducing or preventing losses, promoting, improving, and developing the company, and thus achieving business sustainability in all its economic and social dimensions. and environmental.

Fourth: Results related to the fourth question:

-There is a correlation between Total Quality Management (TQM) and its dimensions (leadership, continuous improvement, customer satisfaction, teamwork, employee empowerment) and risk management. This indicates that TQM, with its dimensions (leadership, continuous improvement, customer satisfaction, teamwork, employee empowerment), has contributed to strengthening risk management by developing scientific methods that must be taken into account when making the necessary decisions to address risks with the aim of reducing or preventing losses.

Fifth: Results related to the fifth question:

-There is a correlation between the application of business sustainability, with its dimensions (economic sustainability, social sustainability, environmental sustainability), and risk management. This indicates that sound risk management in engineering project companies has contributed to enhancing business sustainability due to its role in generating future growth, which in turn leads to ensuring economic gains, stimulating innovation, and reducing the company's impact on the environment.

Recommendations:

In light of the research findings, the researcher recommends the following:

- 1 -Directing engineering project companies in Saudi Arabia to the importance of Total Quality Management (TQM) and its dimensions (leadership, continuous improvement, customer satisfaction, teamwork, employee empowerment) Clients, team, and employee empowerment.
- 2 .Raising awareness among employees of engineering project companies in Saudi Arabia about the importance of risk management in business sustainability.
- 3 .The need for engineering project companies in Saudi Arabia to leverage customer suggestions for continuous improvement.
- 4 .The need for engineering project companies in Saudi Arabia to monitor, evaluate, and analyze customer satisfaction with the services provided.
- 5 .The need for engineering project company management to have a clear vision that embodies its philosophy toward Total Quality Management.
- 6 .The need for engineering project companies to adopt a team-based approach at all administrative levels.

Proposed Research:

- 1 .Conduct further research and studies on the impact of Total Quality Management on achieving business sustainability: the mediating role of risk management in various sectors other than those mentioned in the study.
2. Hold seminars, awareness and training programs, and workshops on Total Quality Management and business sustainability in engineering project companies in Saudi Arabia.

references and sources

- Abdul Muttalib, I., and Al-Sakiti, M. (2021). The Impact of Organizational Culture on Enhancing Total Quality: An Applied Study of the Opinions of Employees of the Supreme Council for Total Quality. *Al-Mithqal Journal of Economics, Management, and Information Technology*, 6(2), 11–41.
- Abdullah, H. (2023). The Impact of Applying Situational Leadership Methods on Improving Project Performance. *Journal of Arts, Literature, Humanities, and Social Sciences*, (95), 159–203.
- Abu Al-Fotouh, A. (2022). The Impact of Employee Participation and Empowerment Practices on the Institutional Performance of Public Organizations: A Field Study of Frontline Employees at the Egyptian National Postal Authority, *Journal of the Faculty of Economics and Political Science*, 23 (1), 205–255.
- Addae-Korankye, A. (2013). Total quality management (TQM): a source of competitive advantage. A comparative study of manufacturing and service firms in Ghana. *International journal of Asian social science*, 3(6), 1293-1305.
- Ahmed, I. (2021). Total Quality as an Approach to Enhancing Financial Performance in Egyptian Sports Clubs. *Scientific Journal of Physical Education and Sports Sciences*, 93(3), 290–300.

- Alabdullah, T. (2022). Management accounting insight via a new perspective on risk management-companies' profitability relationship. *International Journal of Intelligent Enterprise*, 9(2), 244-257.
- Al-Ahmari, M, and Abdelkader, S. (2024). The Impact of Implementing Quality Management on Job Performance in Saudi Universities: An Applied Study at King Khalid University in Abha. *International Journal of Humanities and Social Sciences*, 10(31), 155–172.
- Alam, N. (2020). Social Sustainability and Its Role in the Efficiency of the Built Environment in Urban Communities. Master's Thesis, University of Mohamed Boudiaf, Algeria.
- Al-Athry, A. (2021). Total Quality Management Culture and Customer Focus: A Study of the Relationship Between Customer Focus and Total Quality Management Culture in Kuwait, *Scientific Journal of Business and Environmental Studies*, 12 (3), 86–123.
- Al-Dulaimi, A. (2018). Green Innovation: An Effective Strategy for Addressing the Challenges of Achieving Environmental Sustainability for Business Organizations: A Field Study on the Challenges Facing Service Organizations and the UNDP in Anbar Governorate. *Journal of Economic and Administrative Sciences*, 19(1), 87–102.

- Alghamdi, F. (2020). Total quality management and organizational performance: A possible role of organizational culture. *International Journal of Business Administration*, 9(4), 186-200.
- Al-Ghamdi, F. (2021). Developing Administrative Performance in the Scholarship and University Relations Department at Al-Baha University in Light of the Total Quality Management Approach. *Journal of Education – Al-Azhar University*, 6(40), 241–282.
- Al-Hadrawi, A., and Al-Dhabhawi, A. (2020). The Role of Strategic Awareness in Achieving Organizational Sustainability: A Survey Study of the Najaf Cement Plant. *Kufa Arts* 12 (43), 499–522.
- Al-Hajra, K. (2020). The Moderating Effect of Knowledge Management on Strategic Risk Management Practices and Strategic Entrepreneurship in Projects Affiliated with the Hashemite Fund for the Development of the Jordanian Badia, *Jordanian Journal of Business Administration*, 16(3), 647–679.
- Al-Hamidi, H, and Al-Marawi, S. (2022). The Impact of Total Quality Management Dimensions on Improving Competitive Advantage: A Field Study on the Yemeni Telecommunications Company (Yemen Mobile), *Al-Bayda University Journal*, 3(2), 233–256.

- Al-Maadidi, M. (2016). Sustainability of Competitive Advantages in the Internet Era: A Theoretical Analysis of Content and Mechanisms. Second International Forum: Knowledge in the Digital Economy and Its Contribution to the Formation of Competitive Advantages in Arab Countries, 1–22.
- Al-Masry, S. (2016). The Impact of Strategic Human Resources Planning on the Economic Sustainability of Jordanian Information Technology Companies, Master's Thesis, Amman Arab University, Jordan.
- Al-Naimi, M., Al-Shoura, A., and Al-Tarawneh, R. (2022). The Impact of Implementing Total Quality Management in Smart Organizations: An Applied Study of Computer Information Systems Companies, International Journal of Economics and Business, 8(2), 293–307.
- Al-Nakhili, F, and Mohammed, R. (2022). Achieving Social Sustainability Standards for Facility Pathways Within the City Center: A Case Study of Al-Husseini Al-Bahri Street in Minya City, Journal of Engineering Sciences, 50(1), 20–31.
- Al-Otaibi, S. (2020). The Essence of Employee Empowerment: A Conceptual Framework. International Journal of Educational and Psychological Sciences. 42(60), 11–38.

- Al-Samman, T. (2016). Total Quality Management: A Field Study in a Maternity Clothing Factory in Mosul, Rafidain Development, Iraq, 27(78), 101–120.
- Al-Sharif, H. (2021). Green Information Systems and Technology to Support Environmental Sustainability: IBM as a Model, University Center Si El Hawas, Brika, 4(2), 780–797.
- Al-Taie, Y. (2018). Wisdom Management and Its Role in Achieving Sustainability for Business Organizations: An Analytical Study of the Opinions of a Sample of Leaders at the University of Kufa, Al-Ghari Journal of Economic and Administrative Sciences, 12(35), 205–227.
- Al-Zoubi, M. (2019). Risk Management and Its Role in Enhancing the Strategic Marketing Decision-Making Process: An Analytical Study. Journal of Economic Research of Saad Dahlab University, Blida, 5(4), 27–46.
- Ashour, H. (2020). The Contribution of Internal Auditing to Corporate Risk Management and Its Impact on the Implementation of Sports Club Governance Requirements, Master's Thesis, University of Mohamed Boudiaf, Algeria.

- Bahi, O. (2017). Risk Management Strategy in Economic Institutions. A Published Master's Thesis, University of Mohamed Boudiaf–M'sila, Algeria.
- Balushi, B. (2021). Requirements and Results of Implementing Total Quality Management in Sports Activities Institutions, Journal of Physical Education Research, Volume 68, Issue 130, pp. 91–120.
- Baoush, A., and Kamukh, M. (2021). Organizational Culture in Algerian Universities: A Case Study of the Institute of Economics, Business, and Management Sciences, Mila University Center. Master's Thesis, Abdelhafidh Boussouf University Center, Mila, Algeria.
- Belounas, A. (2011). Quality Circles as an Approach to Total Quality Management. Total Quality Management and Six Sigma Strategy Workshop, Arab Administrative Development Organization, Turkey. 33.(1)
- Biouda, A. (2020). Challenges of Corporate Management's Commitment to Implementing Total Quality Management Principles. Master's Thesis, University of Martyr Hama Lakhdari, El Oued, Algeria.
- Brata, J., & Soediantono, D. (2022). Total Quality Manufacturing (TQM) and Recommendations for Its Application in the Defense Industry: A Literature Review. International Journal of Social and Management Studies, 3(3), 50-62.

- Daghim, J. (2020). Talent Management as a Mediating Variable in the Relationship between Information Technology and Operational Environmental Sustainability: A Field Study of Chemical Industries Companies in Egypt. *Journal of Financial and Commercial Research*, 3(3), 452–490.
- Detlefs, S. (2022). Correlation between medical management and teamwork in multidisciplinary high-fidelity obstetrics simulations. *American Journal of Obstetrics & Gynecology MFM*, 100626.
- Dhaif Allah, M. (2020). Sustainability and Quality of Life: A Development Model, Master's Thesis, University of Martyr Hamma Lakhdar, Algeria.
- EL-Nashar, T. (2020). The Continuous Improvement for Business Sustainability & Corporate Governance to Expand Opportunities of International Finance. *Journal of financial and business research*, 2, 3-27.
- Green, K. (2018). Impact of JIT, TQM and green supply chain practices on environmental sustainability. *Journal of Manufacturing Technology Management*.
- Greuning, H. (2022). Analyzing banking risk: a framework for assessing corporate governance and risk management.
- Gyamfi, B. (2022). An investigation into the anthropogenic effect of biomass energy utilization and economic sustainability on environmental degradation in E7 economies. *Biofuels, Bio products and Bio refining*, 15(3), 840-851.

- Habib, A., and Al-Fakiki, A. (2023). The Role of Total Quality Management in Achieving Competitive Advantage. *Al-Ghari Journal of Economic and Administrative Sciences*, 7(21), 173–187.
- Hamad, A. (2022). Improving Engineering Safety Management in Construction Projects in Jordan. *Arab Journal of Scientific Publishing*, 42(2), 915–941.
- Hanaysha, J. (2023). Impact of innovation capabilities on business sustainability in small and medium enterprises. *FIIB Business Review*, 11(1), 67-78.
- Hassan, R. (2018). The Role of Risk Management Programs in Addressing Risks at International Airports, *Journal of Accounting and Financial Studies*, 13(44), 85–106.
- Hassani, Z. (2021). Banking Risk Management in Islamic Banks. Master's Thesis, Mohamed Boudiaf University of M'sila, Algeria.
- Hassbou, A. (2022). The Role of Risk Management in the Efficiency of Insurance Companies' Performance: A Field Study of the Shikan Insurance and Reinsurance Company, White Nile State. *Journal of Administrative and Financial Sciences*, 1(5), 35–60.

- Ibrahim, I, and Farqad, K. (2021). Risk Management in Bank Credit Granting, *Al-Muhaqqiq Al-Hilli Journal of Legal and Political Sciences*, 13 (3), 9–71.
- Ibrahim, K., and Shaker, S. (2021). The Role of Total Quality Management in Achieving Sustainable Competitive Advantage: A Survey Study of the Opinions of a Sample of Employees in the Training and Preparation Directorate, *Economics Journal*, 1 (1), 40–65.
- Jaljouli, Y., and Rahmon, I. (2020). The Importance of Total Quality Management in Economic Firms: A Case Study of the Health Equipment Company in Miliana, Ain Defla Province. Published Master's Thesis, Djilali Bounaama University, Khemis Miliana, Algeria.
- Jeba, M, and Badie, A. (2018). A Proposed Framework for Measuring the Impact of Environmental Sustainability on Job Satisfaction: A Field Study at Damietta Port. *Journal of Financial and Commercial Research*, Volume 4, Issue 4, pp. 198–217.
- Jumah, P. (2022). An Exploratory Study on the Role of Feasibility Study on Sustainability of Business in Kenya: A Case of Supermarkets in Nairobi County. *Journal of Finance and Accounting*, 6(1), 57-70.
- Junglas, I. (2022). On the benefits of consumer IT in the-e workplace—An IT empowerment perspective. *International Journal of Information Management*, 64, 102478.

- Kamel, R. (2022). The Role of Digital Culture in Achieving Social Sustainability and Bridging the Digital Gap: An Analytical Study of Concepts in Light of the Repercussions of COVID-19, *International Journal of Public Policy in Egypt*, 1(1), 49–62.
- Kaynak, H. (2013). The relationship between total quality management practices and their effects on firm performance. *Journal of operations management*, 21(4), 405-435.
- Khalaf, W., and Al-Khafaji, M. (2022). The Impact of Organizational Excellence on Innovation-Oriented Sustainability Practices (An Applied Study at the Dhi Qar Refinery), *Journal of Petroleum Research and Studies*, 30(3), 82–99.
- Khitan, H. (2022). The Impact of Business Strategy on Institutional Performance Through Total Quality Management: An Applied Study of Food Manufacturing Companies in the Hashemite Kingdom of Jordan. *Journal of the Islamic University for Economic and Administrative Studies*, 30(2), 150–280.
- Labib, O. (2021). The Relationship between Voluntary Disclosure of Sustainability Dimensions of Businesses Listed on the Egyptian Stock

Exchange and the Cost of Capital, *Journal of Contemporary Business Studies*, 7(11), 855–898.

- Lee, H. (2021). The Concept of Risk and Corporate Risk. In *Risk Management* (pp. 3-12). Springer, Singapore.
- Mahsab, A. (2017). The Impact of Implementing Social Sustainability Practices in Supply Chains on Creating a Competitive Advantage for the Organization (A Field Study), *Journal of Financial and Administrative Research*, 18(1), 271–294.
- Menne, F. (2022). Optimizing the Financial Performance of SMEs Based on Sharia Economy: Perspective of Economic Business Sustainability and Open Innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, 8(1), 18-39.
- Mohammad, F. (2022). The Role of Business Sustainability Dimensions in Promoting Social Responsibility: A Survey Study at the General Company for the Manufacture of Medicines and Medical Supplies, Samarra, Iraq. *Babylon University Journal*, 6(4), 36–68.
- Mohammad, Q. (2019). The Role of Business Sustainability Dimensions in Promoting Social Responsibility: A Survey Study in the General Company for the Manufacture of Pharmaceuticals and Medical Supplies, Samarra, Iraq. *Journal of Finance and Business Economics*, 3(3), 71–100.

- Mortada, M. (2018). Achieving Sustainable Development Through the Provision of Digital Services: A Pilot Study of Egyptian Society. *Scientific Journal of the Faculties of Commerce Sector*, 5(9), 100–150.
- Nabila, E. M. (2021). The Role of Organizational Culture on the Implementation of Total
- Nakhla, R., and Mas'ad, R. (2022). Sustainability Standards and Their Impact on the Interior Design of Green Hotels. *Journal of the Arab Society for Islamic Civilization and Arts*, 2(3), 58–96.
- Obeid, H. (2021). The Impact of Academic Accreditation on the Implementation of Total Quality Management at the University of Jordan. *Journal of Educational Studies and Research*, 1(1), 221–251.
- Odaybat, A. (2024). Risk Management and Quality Assurance in the Implementation of Engineering Project Foundations by a Soil Engineer. *Arab Journal of Scientific Publishing*, 4(1), 621–653.
- Rawas, H. (2022). Evaluating the Reality of Total Quality in the Hajj and Umrah System, Applied to Catering Institutions in Makkah Al-Mukarramah, *Journal of Economic, Administrative, and Legal Sciences*, 6(5), 34–55.
- Ruggerio, C. A. (2021). Sustainability and sustainable development: A review of principles and definitions. *Science of the Total Environment*, 786, 147481.

- Saadi, I. (2016). The Contribution of Organizational Culture to the Adoption of Total Quality Management: A Case Study of the Al-Wataba Salt Complex, PhD Thesis, University of Mohamed Ben Khedhir, Biskra, Algeria.
- Sahoo, S., & Yadav, S. (2022). Total quality management in Indian manufacturing SMEs. *Procardia Manufacturing*, 21, 541-548.
- Samani, A., and Amari, A. (2023). The Impact of Construction Risk Management on Building Quality in Riyadh, Saudi Arabia. Mid-Ocean University.
- Saudi Council of Engineers (2024). Smart Reports. Riyadh.
- The Economic Index of the Engineering Sector in the Kingdom of Saudi Arabia (2024). Business Support Sector Observatory, Riyadh Chamber.
- Toke, L. & Kalpande, S. (2020). Total quality management in small and medium enterprises: An overview in Indian context. *Quality Management Journal*, 27(3), 159-175.

Appendices



questionnaire form

Dear Brother

Dear Sister

Peace, mercy, and blessings of God be upon you.

The researcher is conducting a study as part of the requirements for a Master's degree in Business Administration entitled "The Level of Application of Total Quality Management in Achieving Business Sustainability and Its Relationship to Risk Management in Engineering Project Companies in the Kingdom of Saudi Arabia."

Given our expectation of your expertise in this field, the researcher looks forward to your contribution to enriching this study. We look forward to your feedback on each paragraph, including the clarity and precision of the formulation, its relevance to the field it measures, and suggestions for appropriate wording and any other comments regarding the questionnaire.

Please accept my highest respect and appreciation

Total Quality Management Questionnaire						
N	Paragraphs	Degree of application				
		Strongly agree	Agree	Neutral	Disagree	strongly disagree
		5	4	3	2	1
Leadership						
1	he company's management believes that Total Quality Management (TQM) is the optimal approach to sustaining its business.					
2	The company's management has set clear and specific quality objectives.					
3	The company's management provides the infrastructure for implementing quality.					
4	The company's management instills a culture of quality at all levels.					
5	The company's management has a clear vision that embodies its philosophy toward TQM.					
continuous improvement						
6	The company is committed to continuously improving the quality of its services.					

7	The company adopts and utilizes the latest technology in the insurance industry.					
8	The company continually reviews policies and procedures.					
9	The company continually updates its operations.					
10	The company utilizes customer feedback for continuous improvement.					
Customer satisfaction						
11	The company considers customer satisfaction its top priority.					
12	The company considers customer satisfaction a necessary requirement for the sustainability of its business.					
13	The company collects information related to customer complaints and suggestions.					
14	The company works to quickly resolve customer issues.					
15	The company monitors, evaluates, and analyzes customer satisfaction with the services provided.					
work team						
16	The company encourages employees to work as a team.					

17	The company provides opportunities for training and development of its staff on quality systems.					
18	The company delegates sufficient authority to its work teams to accomplish their tasks.					
19	The work teams contribute to finding solutions to work-related problems within the company.					
20	The company adopts a team approach at all levels of management.					
Empowering employees						
21	The company encourages employees to share ideas and gives them space to express their opinions.					
22	The company involves employees in decision-making processes.					
23	The company motivates employees to solve problems they face at work.					
24	The company gives employees sufficient authority to complete the required tasks.					

Business Sustainability Questionnaire						
N	Paragraphs	Degree of application				
		Strongly agree	Agree	Neutral	Disagree	strongly disagree
		5	4	3	2	1
Economic sustainability						
25	The company is committed to providing its services at the lowest possible cost.					
26	The company makes optimal use of its available resources.					
27	The company is committed to providing its services in the best possible way within its available resources.					
28	The company aims to provide added value to customers.					
29	The company's organizational position is more stable, competitive, and sustainable as a result of the success of its operations.					
30	The company's economic activities and programs contribute to achieving community well-being.					
social sustainability						

31	The company provides various social services to the community.					
32	The company's plans include goals related to social responsibility.					
33	The company provides sponsorship programs for talented employees.					
34	The company works to improve its community image.					
Environmental sustainability						
35	The company sponsors environmental awareness campaigns.					
36	The company complies with government environmental legislation.					
37	The company uses technology that contributes to providing environmentally friendly services.					
38	The company works to reduce the consumption of energy, paper, and other resources.					

Risk management Questionnaire						
N	Paragraphs	Degree of application				
		Strongly agree	Agree	Neutral	Disagree	strongly disagree
		5	4	3	2	1
1	Developing successful plans that meet the future missions of engineering project companies					
2	Improving auditing and quantity surveying skills					
3	Enables reconsideration of judgments regarding the integrity of the engineering project's internal control.					
4	Reducing the possibility of errors in engineering design					
5	Solving problems facing unqualified workers					
6	Improving the performance of engineering project supervisors and reducing subjective judgment and assessment, thus reducing the rate of audit error.					
7	Resolving the problem of unexpected funding cuts					

8	Ensuring adherence to professional standards and organizing workflows.					
9	The company works to improve its community image.					

مستوى تطبيق إدارة الجودة الشاملة في تحقيق استدامة الأعمال وعلاقتها بإدارة المخاطر في شركات المشاريع الهندسية في المملكة العربية السعودية

الملخص

هدفت هذه الدراسة إلى قياس مستوى تطبيق إدارة الجودة الشاملة في تحقيق استدامة الأعمال وعلاقتها بإدارة المخاطر في شركات المشاريع الهندسية في المملكة العربية السعودية. اتبعت الدراسة المنهج الوصفي الارتباطي، ولغايات تحقيق أهداف الدراسة تم إعداد ثلاث استبانات، الأولى بهدف قياس مستوى تطبيق إدارة الجودة الشاملة في شركات المشاريع الهندسية وبلغ عدد فقراتها (24) فقرة موزعة على خمس مجالات. أما الاداة الثانية فهدفت إلى قياس مستوى تطبيق استدامة الأعمال في شركات المشاريع الهندسية وبلغ عدد فقراتها (16) فقرة موزعة على ثلاثة مجالات. أما الاداة الثالثة فهدفت إلى قياس مستوى إدارة المخاطر في شركات المشاريع الهندسية. وتكونت عينة الدراسة من (234) مهندساً وقيادياً في مدينة الرياض بالمملكة العربية السعودية. وأظهرت النتائج أن مستوى تطبيق إدارة الجودة ومستوى تطبيق استدامة الأعمال ومستوى إدارة المخاطر في شركات المشاريع الهندسية جاءت بدرجة مرتفعة. كما بينت النتائج وجود علاقة ارتباطية بين تطبيق إدارة الجودة الشاملة واستدامة الأعمال على إدارة المخاطر في شركات المشاريع الهندسية.

الكلمات المفتاحية: إدارة الجودة الشاملة، استدامة الأعمال، إدارة المخاطر، شركات المشاريع الهندسية، السعودية.

**The Level of Total Quality Management (TQM) Application in Achieving
Business Sustainability and Its Relationship to Risk Management in
Engineering Project Companies in the Kingdom of Saudi Arabia**

Abstract

This study aimed to measure the level of TQM application in achieving business sustainability and its relationship to risk management in engineering project companies in the Kingdom of Saudi Arabia. The study followed a descriptive correlational approach. To achieve the study objectives, three questionnaires were developed. The first aimed to measure the level of TQM application in engineering project companies and consisted of (24) items distributed across five domains. The second tool aimed to measure the level of business sustainability application in engineering project companies and consisted of (16) items distributed across three domains. The third tool aimed to measure the level of risk management in engineering project companies. The study sample consisted of (234) engineers and leaders in Riyadh, Saudi Arabia. The results showed that the level of quality management application, the level of business sustainability application, and the level of risk management in engineering project companies were high. The results also demonstrated a correlation between the application of TQM and business sustainability on risk management in engineering project companies.

Keywords: Total Quality Management, Business Sustainability, Risk Management, Engineering Project Companies, Saudi Arabia.

