**Analysing Major Challenges In Effective Implementation Of Quality Management System In Construction Organizations In The KSA**

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# CHAPTER ONE

# Introduction

## Background of the Study

### Construction Industry of Saudi Arabia

The Kingdom of Saudi Arabia (KSA) acknowledged the construction sector as a critical component of its economic growth. This crucial industry substantially contributed to the nation's economy and overall growth. The construction sector is at the forefront of encouraging progress in the nation due to its enormous potential for creating jobs and improving infrastructure (Azmi et al., 2022). The construction sector in the KSA has increased in recent years, and as a result, so has its share of the country's GDP. Saudi Arabia's GDP from construction climbed from 30735 SAR in the fourth quarter of 2022 to 30864 SAR in the first quarter of 2023 (Tradingeconomics.com, 2023). The sector's continuing growth not only improved economic metrics but also acted as a spark for several adjacent businesses, having a knock-on effect on the economy as a whole. Additionally, an enormous section of the workforce in the nation had employment options thanks to the building industry, which made an immense contribution to job creation (Al-Jarf et al., 2022). The need for specialists and skilled labor in the construction industry is growing, promoting more economic involvement and better living conditions for Saudi citizens.

Moreover, the government's dedication to major infrastructure projects is one of the factors fueling Saudi Arabia's current construction boom. The nation places high importance on infrastructure investment since it facilitates transportation, improves connectivity, and supports the expansion of several industries, including tourism, logistics, and manufacturing. New cities, airports, seaports, highways, and public facilities are among the ambitious projects started, increasing demand for construction services and luring international capital (Alghamdi et al., 2022). The Kingdom of Saudi Arabia's construction sector is a crucial economic expansion and development engine. Its contributions to the GDP, creating jobs, and improving infrastructure highlight its importance to the country's growth. With the government's continuing support and investment in ambitious projects, the construction industry is prepared for additional analyse encouraging prosperity and sustainable development in the following years.

### Quality Management System

To guarantee the supply of high-quality goods and services in the dynamic construction sector, a solid Quality Management System (QMS) must be implemented. The QMS functioned as a systematic strategy to manage processes, procedures, and regulations, emphasising quality and consistency and ensuring that construction projects meet or surpass client expectations (FEYERA, 2020). The 14 Point Foundational work of Deming and the concepts of Total Quality Management (TQM) served as the foundation for QMS as it developed into a complete framework that motivates organisations to attain and uphold the highest levels of quality (Aichouni et al., 2023). Organisations that adopted the PDCA (Plan-do-Check-Act) cycle, as outlined in the ISO 9001 standard, principally made sure that their operations were continuously improving.

The QMS's focus on customer satisfaction is one of its key benefits for the construction sector. Organisations could meet and exceed client expectations by carefully analysing customer needs and aligning project outputs accordingly. Client satisfaction increased the likelihood of giving favourable feedback, which enhanced the brand's reputation and opened up additional options for future initiatives (Mon, 2020). In addition to that, from the beginning to the end of the building project, QMS delivered an organised and disciplined approach. It allowed construction organisations to retain uniformity and efficiency while minimising mistakes and rework by establishing defined procedures and explicit quality targets. The QMS developed a quality culture throughout the company, encouraging a shared dedication to excellence among all workers through efficient execution (Leonov et al., 2022). Hence, implementing a thorough quality management system is essential to accomplishing customer happiness and the success of building projects. However, there are several difficulties in applying QMS in the KSA building organisation. The thesis aims to analyse the barriers to and influences supporting the successful adoption of the Quality Management System (QMS) in construction organisations throughout the Kingdom of Saudi Arabia (KSA).

## Research Problem

Several significant obstacles prevent the proper adoption of Quality Management Systems (QMS). These issues were widespread in the Kingdom of Saudi Arabia (KSA) and other nations. The main challenges to implementing a QMS successfully in the construction industry included a shortage of experienced employees, the widespread practice of awarding contracts to the lowest bidder, dysfunctional team chemistry, and several onerous building codes. Inadequate resource allocation, resistance to change, and a lack of awareness and comprehension of QMS were other issues that construction businesses ran with. The construction sector significantly relied on a trained and competent workforce to ensure the completion of high-quality projects. Hence the need for more skilled employees constituted a severe difficulty (Brooks et al., 2021). Additionally, simply relying on the lowest bidder to award contracts resulted in project quality compromises and had a detrimental influence on the efficiency of QMS. The execution of the QMS was further hampered, and project results were compromised by ineffective team dynamics that arose due to communication breakdowns or a lack of cooperation. Similarly, the unwillingness of stakeholders to adopt new procedures and methods is a significant impediment to the adoption of QMS (Tachie and Mancotywa, 2021). This opposition delayed the QMS's potential benefits for the organisation and hampered a seamless transition.

Furthermore, multiple severe building rules presented compliance difficulties for the construction industry, making it more difficult to apply uniform quality standards. In addition, employees' ignorance and need for more comprehension of QMS principles could have improved their successful incorporation into everyday operations. Construction organisations are advised to give their staff thorough training and education on QMS concepts and practices to solve these issues and guarantee effective QMS implementation (Ahmed, 2020). By solving these issues, construction organizations could improve the QMS implementation more successfully, resulting in better project results, increased customer satisfaction, and long-term industry growth. Based on the findings, recommendations will be made to ensure that staff members receive enough training and education to improve their knowledge of and understanding of QMS concepts and practices.

## Research Objectives

These are some of the study's particular research objectives;

* To analyse the key components of Quality Management Systems in Construction Organizations.
* To examine the benefits of implementing a Quality Management System (QMS) in construction organisations in the KSA.
* To identify and analyse significant challenges faced by construction organisations in the KSA during the implementation of QMS.
* To recommend strategies and best practices for successful QMS implementation in construction organisations in the KSA.

## Research Questions

In the study, the following research questions will be addressed;

* What are the benefits of implementing QMS in construction organisations in the KSA?
* What are the significant challenges construction organisations face in the KSA during QMS implementation?
* What are the best practices for successful QMS implementation in construction organisations in the KSA?

## Significance of the Study

The study has great potential to advance Saudi Arabia's building sector. The research would provide solid frameworks that improve project results and customer satisfaction by looking at important QMS components. Exploring the advantages of implementing a QMS led more businesses to do so, which enhanced project effectiveness, cost-effectiveness, and risk management. Furthermore, the research would help stakeholders create successful plans for QMS integration by highlighting issues and making suggestions. In the end, this study has the potential to promote a culture of excellence and quality, raising building standards in the KSA and enhancing the sector's and society’s overall welfare.

## Study Structure

The study constructs its structure using a suitable methodology to aid in comprehending the research process. The background information on the construction industry in KSA is presented in Chapter 1, along with the implications of the QMS and the issue definition, objectives, and research design. A literature review is included in Chapter 2. The study's techniques and materials, including the networking theory and strategy, data distribution, and data source, are discussed in Chapter 3. The findings of the data analysis and the interpretation of the data collection are presented in Chapter 4. The overall results and their consequences are presented in Chapter 5, and the study's significance is also covered. A discussion of the findings is presented in Chapter 6, followed by reliable suggestions and recommendations. Chapter 7 brings the study to a close via conclusion.

## Sub-Conclusion

The main emphasis of this chapter's introduction to the study issue was the difficulties in adopting Quality Management Systems (QMS) in Saudi Arabian (KSA) construction organisations. It brought attention to how important the research was in helping to advance the nation's building sector. To analyze QMS components, consider advantages, pinpoint problems, and provide solutions for effective QMS implementation, the research's objectives and questions are defined. The study could improve project results, customer happiness, and general industry standards.

# CHAPTER TWO

# Literature Review

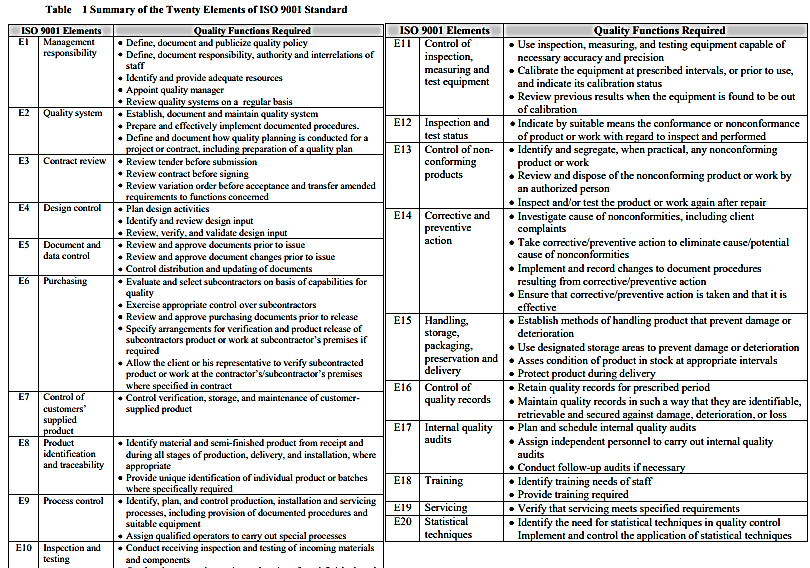
## Introduction

The chapter evaluated pertinent literature on quality management systems (QMS) in the construction sector and provided the theoretical underpinning for the investigation. It provided an overview of the QMS-ISO 9001 standard and its importance, covered practical QMS techniques in the worldwide construction industry, and highlighted difficulties encountered during QMS implementation. A summary of current QMS procedures in the Saudi Arabian construction sector was also provided in this chapter. It investigates why construction businesses adopt QMS and how government laws affect QMS implementation. The chapter also looks at the challenges that prevent the successful use of QMS, painting a clear picture of the issues that must be resolved for effective QMS integration in the construction sector. This chapter establishes the framework for the upcoming study, directing the inquiry into the fundamental difficulties and possibilities affecting QMS in the construction sector by analysing the current literature and examining the Saudi environment.

## ISO 9001 Standard

ISOs are widely discussed among various research studies as the pillar of quality control systems. In the United Kingdom (UK), quality control systems were initially drawn from nuclear and military standards and later adopted as “BS5750:1979” in the industrial sector. However, these systems did not enter the UK building sector until the 1980s and the early 1990s. This adoption was primarily sparked by local and federal regulations requiring construction firms to have certified quality systems to participate in open project bidding. In this manner, construction firms started implementing these quality control systems to meet regulatory standards and take advantage of tendering possibilities (Xaba-Jama, 2019). Integrating quality management systems became essential in the construction industry since it helped in standard compliance, project success, and customer satisfaction. As a benchmark for implementing efficient management and process control across various industries and sectors, the ISO 9000 series became the recommended Quality Management System (QMS) model supported by proponents of the quality movement. The construction industry, in particular, embraced this model (Rao et al., 2022). In one credible study, Barbosa et al. (2022) enlightened that the ISO 9000 series was first created by the “International Organization for Standardization-Technical Committees” (ISO-TC 176) in 1987. Updates were made in 1994 and 2000, and the most recent version is ISO 9001:2008; however, it is not essential to rewrite excellent papers to comply with the most recent standard because the 2008 version did not make any substantial modifications from the 2000 version.

In the context of ISO 9001 competencies Patel and Pitroda (2021) published that adopting ISO 9001 provided construction organisations with several advantages, including increased productivity, higher customer satisfaction, improved credibility, and better project results. Construction companies who followed the ISO 9001 framework simplified their operations, put standardised procedures in place, and kept a customer-focused mindset. Construction businesses could identify quality concerns quickly because of ISO 9001's systematic and well-defined strategy, which sped up continuous development and sustainable growth. Despite each project being unique and having several subcontractors and suppliers, the ISO 9001 standard could be effectively implemented in construction businesses and their projects due to its general character. Due to its adaptability, it was a valuable tool for construction companies looking to improve their management techniques, guarantee process control, and provide consistently high-quality results. Moreover, the emphasis placed by ISO 9001 on leadership, customer focus, and employee engagement helped to promote a culture of quality and accountability within the construction industry. It promoted employee involvement (Krajcsák, 2019), essential for implementing QMSs and organisational transformation.

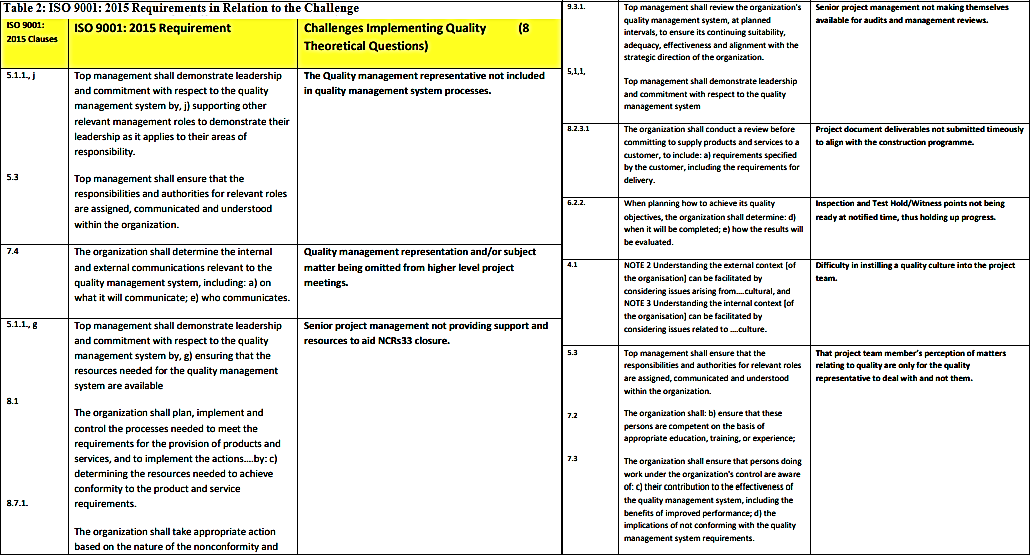


*(Rumane, 2011)*

Additionally, another research by Akinnusi and Nel (2020) indicated that to fully benefit from implementing the system, each of the 23 sub-clauses in the QMS-ISO 9001 standard's five major clauses must be followed to the letter. ISO 9001:2008 replaced the 20 elements that were the foundation of ISO 9000:1994 with five clauses, but the process-based approach's core principles remained. The construction sector included the 20 aspects as QMS elements because of the standard's versatility, which addressed a wide range of quality-related activities unique to construction-related enterprises (Table 1). In addition, international professionals affiliated with ISO-TC 176 contributed their aggregate knowledge and skills to developing the ISO 9001 standard. It included eight fundamental quality management principles, including "customer focus," "leadership," "people involvement," "process approach," "system approach to management," "continual approach," "Factual approach to decision making," and "mutually beneficial supplier relationships" that were meant to serve as a framework for improving an organisation’s performance (Willar, 2012). On the collaborative ground, these research facts established that the construction sector profited from the widely used and successful QMS model provided by the ISO 9000 series, especially ISO 9001. Its broad application and emphasis on customer satisfaction make it an essential tool for construction organisations looking to improve their management practices and consistently provide high-quality project deliverables. Construction companies might build a solid basis for long-term performance, stakeholder confidence, and continual development by applying ISO 9001.

### Requirements of ISO 9001: 2015 About the Challenges

The Quality Management System (QMS) standards are detailed in the comprehensive international standard ISO 9001:2015. It recommended how businesses could raise customer happiness, guarantee constant product and service quality, and promote ongoing development (Helmold, 2023). In one of the recent studies by ‌Ross (2021), the eight theoretical questions given for significant construction projects and the primary data questionnaire align with the pertinent sections of ISO 9001:2015 (Table 2). The core data questionnaire probably covered various QMS implementation-related topics, including customer focus, leadership commitment, process methodology, and employee participation. Additionally, it asked how the company recognised and handled risks and opportunities, monitored performance, and implemented corrective measures as necessary. Theoretical inquiries, based on knowledge gained from implementing quality in significant construction projects, attempt to understand how the QMS assisted in effective project management, regulatory compliance, and the development of cooperative partnerships with suppliers. The questionnaires and theoretical questions' use of ISO 9001:2015 guidelines demonstrated a dedication to bringing construction projects into compliance with widely accepted quality standards. This strategy made executing a QMS methodically and organized easier, encouraging continual project success and development.



*(Ross, 2021)*

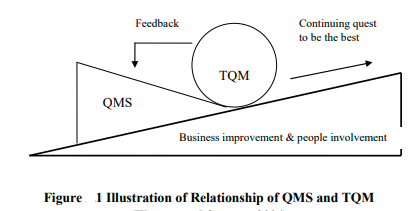
## Quality Management System in Construction

An organisation’s primary business sector requires a complete structure of rules, methods, and procedures known as a quality management system (QMS). Although it is related to Total Quality Management (TQM), QMS differs in that it emphasises "strong leadership" and acknowledges the reciprocal nature of supplier relationships, which are fundamental concepts in the management of building projects (British Assessment Bureau, 2019). Even if QMS and TQM did not wholly "Integrate Organization Systems," there is still some integration, such as incorporating “quality, health, safety, and environmental auditing and yearly management reviews”. From the standpoint of the construction industry, the sub-section established the concepts of quality and QMS and examined the efficacy of QMS implementation in light of prior research data and literature.

### Definition of Quality in Construction

The concepts "quality," "quality management system (QMS)," and "total quality management (TQM)" needed to be defined and discussed objectively in the context of the building sector. Numerous forerunners of the quality movement, including Deming, Juran, Crosby, Feigenbaum, and Taguchi, provided their viewpoints since there is no one specific definition of "quality." However, ISO DIS 9000:2000's definition of "Quality" as the degree to which intrinsic qualities satisfy criteria suggests that quality in the construction sector is only attained when the demands of all project stakeholders are satisfied (Kissi et al., 2019). Similarly, according to Adekunle et al. (2022), "Quality Management" refers to an essential component of general management that establishes and executes the quality policy in construction. It concerns the roles, duties, protocols, methods, and tools utilised to apply quality management efficiently. Construction businesses must use a "quality management system" (QMS) to attain quality in business performance. As part of the QMS, the organisation’s business policy, management roles, processes, and controls were formally stated to meet or exceed stakeholder expectations while fulfilling the company's business goals. In alignment with this, another core study by Alawag et al. (2023) established that the idea of quality in a building has several facets and demands consideration of various important factors. A QMS is a strategic instrument for achieving quality objectives for construction organisations. Management commitment, consistency mechanisms, data utilisation, teamwork, and training were vital quality ideas for QMS implementation. The findings showed that a well-implemented QMS is essential for the success of construction enterprises. In line with this, Hoyle (2017) highlighted that a system that satisfies customer needs, clear definitions of roles, effective process organisation, adherence to industry standards like ISO 9001, a sense of ownership and commitment among employees, and continuous review for ongoing improvements are just a few of the fundamental ideas that made QMS implementation effective.

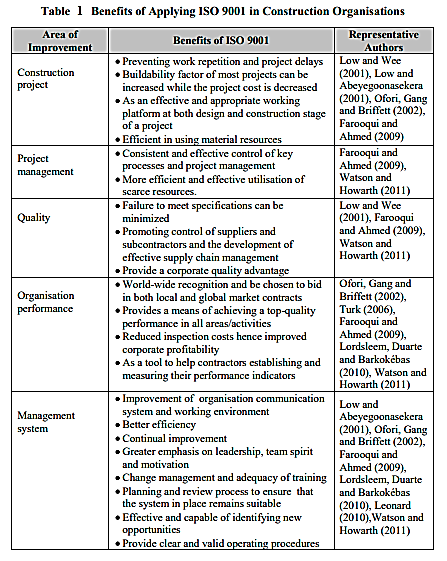
Moreover, compared to QMS, total quality management (TQM) is considered a higher-level notion of strategic success. TQM aims to increase continuous quality management, promote customer satisfaction, and involve the organisation in delivering high-quality outputs. While some construction firms used TQM to improve quality and productivity, others embrace Construction organisations must fully understand the principles of quality and QMS to enhance company performance and satisfy stakeholders' expectationss shown in (Figure 1), emphasising the areas where the two concepts intersect (Zand and Dehyouri, 2022). Collectively these research facts signified that the construction sector encountered difficulties defining "Quality" by successfully applying QMS and adopting the TQM mindset. To enhance company performance and satisfy stakeholders' expectations, construction organisations must fully understand the principles of quality and QMS. Continuous improvement, improved customer happiness, and higher competitiveness were the results of implementing QMS. Companies who climb the "quality ladder" eventually adopt TQM's more comprehensive methodology to succeed in every facet of their business operations.



*(Willar, 2012)*

### The Effectiveness of QMS Implementation

Effective planning, operation, review, and continual improvement at all levels of the organisation were necessary for successfully implementing a Quality Management System (QMS) based on the ISO 9001 standard. According to the British Standards Institute, effectiveness refers to how well-planned actions and intended outcomes are carried out. This phrase has a lot to do with deploying a QMS since organisations that do so must successfully achieve all of their quality goals and standards (Lannelongue et al., 2021). However, Oliveira and Lopes (2020) argued that the BSI's definition of "effectiveness" is inaccurate since it creates the false impression that effectiveness can only be attained by adhering to predetermined standards and quality goals. In actuality, effectiveness included both aspects of satisfying the required standards for quality set out by the organisation and the predetermined standards outlined in the eight quality management principles and ISO 9001 components. It is also emphasised that a construction company's operations and whether it was successful in reaching its objectives and exceeding customer expectations are key factors in determining a QMS's performance. Recent publications on construction quality management highlighted the crucial steps necessary for a Quality Management System (QMS) based on ISO 9001 to be implemented successfully. Madsen et al. (2022) emphasized that ISO 9001 continues to be a system focused on processes with a heavy emphasis on compliance, needing strict organizational performance evaluations leading to accreditation. The main goal of implementing a QMS is to ensure that all stages of the job, from design and development through manufacture, building, and maintenance, are carried out according to standards, eventually leading to customer satisfaction. Titu et al. (2023) illustrated the need to continually enhance the QMS to comply with customer and regulatory obligations while consistently delivering goods that meet or exceed customer expectations and satisfaction.



*(Willar, 2012)*

Additionally, the possible advantages of implementing ISO 9001 for construction organizations were outlined by Willar (2012). Even in highly competitive construction situations, effectively adopting a QMS and embracing quality values or a high-level quality mindset, whether through ISO 9001 or TQM, produced considerable benefits (Table 1). This strategy increased competitiveness and success in the construction sector by demonstrating an organisation’s dedication to quality and customer satisfaction and ensuring constant improvement in processes and services. Similarly, as per another study, after getting ISO 9001 certification, most Malaysian builders saw a considerable increase in their company's competitiveness, ranging from 31% to 80%. This emphasised how crucial it is for construction businesses aiming to lead the industry to create and successfully deploy QMS (Cződörová and Gnap, 2023). Nevertheless, the implementation procedure presented difficulties, contrary to the advantages of deploying ISO 9001.

## QMS and KSA’s Construction Sector

The construction industry of KSA is the largest and fastest-expanding sector. Amri and Marey-Pérez (2020) declared that its organisational culture, business approaches, labour and material supply chain, and management skills are distinguished and give its industry a competitive advantage in the Gulf market and around the world. Although the economic stability of the KSA is stable to the extent that the government of the state funds public infrastructures (EssamShaawat et al., 2019). Despite such success and expansion, the quality management system has not been achieved yet in the KSA (Albassam, 2019). The mismanagement leads to budget overruns and delays in the project completion. The literature on the QMS is scarce in the KSA construction sectors compared to other countries. For a considerable period, there has been an acknowledgement of the importance of quality management systems, which has resulted in the creation and execution of numerous systems and approaches (Aichouni et al., 2023). Trigunarsyah et al. (2023) contend that the establishment of a proficient quality management system (QMS) and its implementation throughout the entire project life cycle and relevant organisations are critical in ameliorating unsatisfactory project delivery outcomes. However, the effective implementation of the Total Quality Management (TQM) system has the potential to enhance the construction industry of the Kingdom of Saudi Arabia (KSA) beyond its competitors (Alawag et al., 2023). Specifically, TQM exhibits a significant positive association with the development of construction quality culture, a crucial concern for project proprietors.

According to Warsi et al. (2023) research, Saudi Arabia's construction industry has adopted SO 9001:2015 to a large extent. Renukappa et al. (2021) contended that the Total Quality Management (TQM) adoption in this industry is hampered by conflicts about its significance, a lack of professional and technical know-how, flaws in training and development systems, and institutional frameworks' constraints. Abdelalim and Eldesouky (2021) reported that the construction industry's most widely used model is ISO 9000, which was developed by the International Organisation for Standardisation. According to a study by Jaiswal et al. (2022) that used regression analysis to examine the effectiveness of TQM in the KSA construction sector across four dimensions—management, quality control, inspection, and assurance—it was discovered that both quality management and assurance have a significant positive impact on the project's overall quality. According to Do et al. (2021), construction projects typically entail substantial resource quantities and dynamic processes, thus, attaining superior quality depends on the management of consistent organisational processes. In contrast, Ali AlShehail et al. (2022) asserted that effective information system management, quality reporting documentation, meticulous recording of quality-related data such as inspections and identified issues, and collaboration among stakeholders to address these issues and ensure intended quality control are all essential for developing and implementing a standardised Quality Management System (QMS) within an organisation. Moreover, Riaz et al. (2023) emphasized that the imperative need to deliver quality projects and services in the Saudi construction market necessitates the efficacious implementation of a Quality Management System (QMS). Nonetheless, the unique characteristics of the Saudi construction industry render existing QMS guidelines inapplicable.

## Barriers to QMS Implementation

Extensive research has been conducted to investigate the challenges associated with implementing a QMS in the construction industry (Mon, 2020; Odubiyi et al., 2019; Kumar and Kumar, 2019). Olafsdottir et al. (2019) also examined that the implementation of a QMS in the construction industry poses significant managerial challenges. While QMSs can potentially address longstanding issues in the sector, significant obstacles and hindrances still exist that prevent these systems from being effectively installed (Mhatre and Kumthekar, 2021).

### High Cost Impeding QMS Implementation

The perceived high cost of quality management systems (QMSs) has deterred a number of construction enterprises from embracing their potential benefits. According to the authors, financial investment and time are the biggest barriers preventing construction businesses from adopting a QMS (Mhatre and Kumthekar, 2021). The potential reason for not investing in the QMS in the construction organisation is the effectiveness of the procedure, which is still in process.

### Organisational Culture as a Barrier

The adaptation challenges of pre-existing quality management systems in the KSA construction industry were explored through an empirical study conducted by Alanazi (2021). It was found that the primary obstacle to implementing such tools and techniques in the region is the organisational culture. According to Riaz et al. (2023), in the Saudi Arabian construction industry, obstacles to implementing a Quality Management System (QMS) can be classified into two main categories: organisational and cultural. Numerous challenges from an organisational perspective that need to be resolved are a management tendency to favour contractors with the lowest tenders, the need to develop equitable team efficacy, inadequate staff training and competency, insufficient resources for improving quality, and a lack of leadership support. On the other hand, cultural factors hindering QMS deployment include required resources and costs, necessary documentation, job pressure, irrelevant quality programs, insufficient time, and difficulties with QMSs (Odiba et al., 2021).

An additional study by Pehlivan and Cicek (2021) revealed that the hindrances to incorporating a quality management system include organisational culture, the willingness of higher authorities to customise and adapt the QMS, as well as reliability and tangibility dimensions. In support of this finding, Lekan et al. (2022) identified the issues that prevent the efficient implementation of a QMS into five categories, including the tendency to perceive a QMS as merely a tool for marketing, a lack of expertise and awareness, a lack of desire, a lack of instructional materials, and qualifications for conducting quality audits. Prior research in other countries has also established that a company's or organisation’s specific culture, business performance, quality control strategy, and national development policy are all distinct factors that are directly linked to their QMS (Bouranta et al., 2019; Bravi et al., 2019).

### Lack of Instructions and Awareness

Furthermore, insufficient guidance provided to project teams, a crucial component in ensuring staff members possess the requisite knowledge and acclimation to the Quality Management System (QMS) standards, may also contribute to the deficiency in capacity (Abeysinghe, 2022). However, according to Ali et al. (2022), the issue of management commitment in the construction industry is related to two factors: the need for recognition of the benefits of implementing a QMS and the preference of senior management for prioritising time and finances over quality. Ruth (2021) found that lack of awareness and knowledge have been asserted as significant obstacles to implementing a QMS in the construction industry. Moreover, Dreković et al. (2021) examined that major barriers to establishing a QMS in the construction sector have been highlighted as a lack of awareness and understanding. Andhika and Latief (2020) reported that Indonesian construction companies face a number of obstacles when it comes to efficiently implementing ISO 9001 Quality Management Systems (QMS). These include a lack of awareness of the objectives and significance of QMS, inadequate design of reward systems, insufficient dissemination of QMS, insufficient backing from senior management, insufficient funding, challenges in supervising subcontractors and suppliers, ineffective communication both internally and externally, lack of commitment from the company, and a reluctance to carry out QMS.

### Staff's Resistance to Change

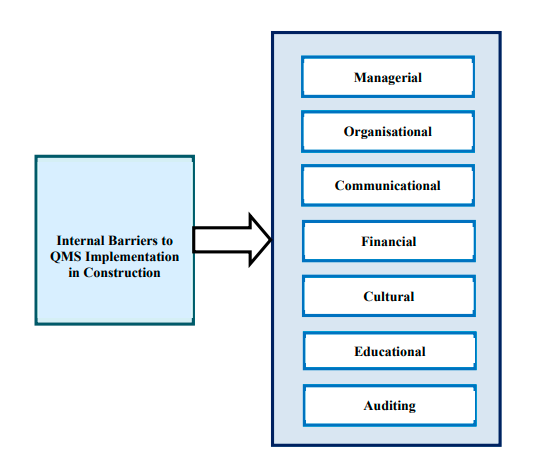
Furthermore, one of the significant obstacles to the effective implementation of QMS in the construction sector is the staff's resistance to change (Elsokhn and Ezeldin, 2021). These workers must swiftly adjust to the ongoing changes related to QMS procedure and development. In addition, Mohammadi et al. (2021) asserted that the key challenges are securing employee support for the adoption of the QMS and lacking financial and human resources. Related staff members attribute resistance to the knowledge that any modification to the QMS criteria poses a risk in terms of ambiguity and displacement of the necessary new knowledge and abilities (Mitchell and Fakhruddin, 2022). These difficulties arise in the context of organisational structure, control of record keeping, the definition and maintenance of procedures, ensuring customer satisfaction, promoting interaction between production departments and quality, managing costs, and conducting evaluations of human resources. These difficulties are aligned with the findings of a research study by Trigunarsyah et al. (2023), the primary obstacle hindering the implementation of appropriate QMS within the Saudi Construction Company (SCC) is the over-reliance on a single type of standard, such as ISO 9001:2015, without due consideration of the specific requirements of the domestic market.

### Documentation Complexity and Misinterpretation Hindering the Effective QMS Implementation

Scholarly sources claim that a lack of understanding or unfamiliarity with the basic documentation requirements results in a substantial amount of excess paperwork that is difficult to manage or govern. In addition, Masuin et al. (2020) found that substantial obstacles, such as the organisation’s attitude to quality assurance and their performance in nonconformance reporting and submissions, limit the successful execution of QMS. In addition, Mokwena (2020) also posited that the amount of information and paperwork needed is a significant obstacle to implementing QMS in building projects. These obstacles are viewed as being essential elements in the implementation of QMS. This is because a successful Quality Management System (QMS) necessitates the management of a sizable number of documentation-related tasks throughout the system's implementation process (Nasereddin and Price, 2021). The issue of incorrectly understanding QMS requirements is related to the complex necessary components of a Quality Management System (QMS), which are sometimes difficult to understand owing to the abstract vocabulary they use (Egwunatum et al., 2022). Numerous studies have recognised this difficulty as a hindrance to the QMS's successful deployment. Additionally, a company's insufficient expertise and resources make it challenging to comprehend a QMS's requirements.

### Lack of Communication

A major barrier to the adoption of a Quality Management System (QMS) is inefficient communication, which is required for the successful implementation of a QMS both inside and outside the organisation. Samanta and Gochhayat , 2023 asserted that poor communication in the construction sector is ascribed to a lack of knowledge and resources, insufficient skill and training, and miscommunications amongst staff members resulting from different cultural and racial origins. Ajgaonkar et al. (2022), in defining challenges, highlighted that a partial perception that QMS application may cause work disruption or loss of productivity, a multicultural work environment leading to discrepancies in QMS comprehension, insufficient commitment, and resistance to change current practices for embracing better QMS, and a lack of combined standards and specifications in the local construction sector.



*(Ahmed, 2020)*

## Research Gap

The studies in the context of QMS implementation and challenges have been published in other countries, including Australia, Egypt, Yemen, the USA, and Canada. The relationship between the quality management system and project success has been the subject of numerous studies. However, none of the associations was found that specifically addressed the issue in the KSA region, despite the fact that there is already research on QMS adoption in the global construction sector, studies that specifically address the particular challenges that construction organisations in the Kingdom of Saudi Arabia encounter are lacking in detail. The acceptance and efficacy of QMS in this particular scenario can be strongly impacted by the cultural, legislative, and economic situation in KSA. Therefore, additional contextualised and localised research is required to dive deeper into the difficulties experienced by construction organisations in KSA while implementing QMS. The results of earlier research were also less conclusive and valid because of the small sample sizes and limited use of statistical methods. However, this study will provide a thorough examination of the influence of quality management practices on the accomplishment of building projects in KSA, thereby bridging the aforementioned gap.

## Summary

The literature review demonstrated the broad nature of studies in the context of QMS implementation effectiveness, significance and challenges in the construction sector. Also, the previous findings on the KSA construction sector that has been employing QMS also explored its success and backdrops. The identifying challenges associated with QMS implementation in the construction sector indicated that organisational culture, lack of communication, resistance to change, inadequate knowledge and awareness, poor documentation, financial lacking, and unsupported management restrict the efficiency of QMS implementation.

# CHAPTER THREE

# Methodology

## Research Philosophy

The study focuses on examining the challenges in the efficient planning of a quality management system in the constructive industry in the Kingdom of Saudi Arabia. This shows that the study includes the primary data involving the surveys or the questionnaire data in conducting the research methodology (Sarhan et al., 2017). There are several articles presented internationally which has a major centre of attraction on the implementation of the quality management system but specifically for the region of Saudi Arabia, it isn’t easy to notice a particular study in analyzing the findings of it. The study applies quantitative data analysis and needs a well-maintained and well-structured questionnaire to analyse the research study. Research Philosophy interacts with the nature of the study whether the study is based on qualitative or quantitative data analysis (Sarhan et al., 2018). The study in effective implementation of quality management focuses on the quantitative data techniques which examined the data. The research study implies a deductive approach to analysing the effectiveness of the quality management system in the Kingdom of Saudi Arabia (Shaqour, 2022).

Interpretivism Research Philosophy: this research philosophy explains the sociological aspect of the research in which the phase or the action takes place depending on the experiences, trusts, and importance of the society (Bajjou and Chafi, 2018). A qualitative data study is essential for the data related to the person’s reaction to social outcomes. Participants are collected for analysing their beliefs in identifying the practical approach to the quality management system in Saudi Arabia. The valuable aspects of the research study show that people are determining the quality either based on the dependent or the independent values, which are considering the quality assurance aspects in checking the positive impacts of the quality on the constructive company. The research methodology emphasises the inductive approach (Ahmed et al., 2021).

Positivism Research Philosophy: This part of the research philosophy seeks information that depends upon the data that can be analysed, recorded, and observed within the research. Positivism research seeks to attract quantitative data analysis. The research study data is collected from the number of measured observations (Blaise, 2019). The findings for this research philosophy were conducted through several surveys and a questionnaire for explaining the research in detail. The study gives hypothetical considerations in support of the deductive that are measured through the variables and the numbers of the scientific approaches to the research (Sarhan et al., 2017).

The rationale for Choosing Positivism: This study has been demonstrating to choose positivism in the research philosophy that could be considered with objectivity, empirical evidence and the use of the scientific method in the study and acknowledged social phenomena. This study adopts a positivist approach, the research aims to uncover the object truth and the casual relationship under the specific consideration. In this case of challenges in QMS implication, Positivism has been approaching unbiased analysis of the underlying factors contributing to the challenges that have been facilitating more accurate results in the study approach.

## Research approach

To determine the planning of the construction in Saudi Arabia Construction Company, a vital questionnaire survey was established to understand the deep knowledge of the construction site in Saudi Arabia (Sarhan et al., 2018). The approach gives importance to the quantitative techniques and tools that are increasing the actions taken for explaining the challenges occurring for an efficient implementation in the Saudi Arabia construction industry. The research approach consists of three aspects for the study first one is qualitative, the second one is quantitative, and the third one combination of both the study which means a mixed study (Shaqour, 2022). But the research study for implementing quality management on the construction site in Saudi Arabia is conducting a quantitative research approach. The research conducts the points regarding the study in checking the stages for implementing the quality management system in the Kingdom of Saudi Arabia construction company. Also, it evaluates the benefits in the role of a quality management system which can overcome the challenges in the construction industry of Saudi Arabia (Bajjou and Chafi, 2018).

Deductive approach: the deductive approach includes the research with the beginning of establishing the hypothetical facts from the study. Then the facts are examined and collected to check the hypothetical considerations for the research study. The deductive approach emphasises the quantitative data analysis within the research study (Hadidi et al, 2017). However, the deductive approach would be a better insight that would be tested under the resistance of their hypotheses through the data collection of the relevance of data. It would also be allowing the verification or the rejection of the relevance hypothesis as the pre-establishment.

Inductive approach: the inductive approach focuses on the explanation that the researcher gathers the information connected to the research study. This gives importance to the qualitative data analysis study for the research (Blaise, 2019). However, the inductive approach has have been considered with the inclusion that generated new insights into the phenomena and the theories, which is based on the specific observation and the data collection. It would be allowing the deeper acknowledgement of the study and it would enable to demonstration of the pattern and relation.

The rationale for Choosing the Deductive Approach: This study has chosen the deductive techniques because this study would demonstrate the particular theory by collecting and analysing the empirical data. This approach would allow this research to start with a well-determined theoretical framework and then empirically validate the proposed hypotheses. The challenges in QMS implication, the deductive approach is suitable to formulate the hypotheses based on existing literature, gathering and confirming the data that would disprove the hypotheses, and it would lead to more focused and rigorous insights to determine the challenges.

## Research Design

The research design is the setup of the techniques for the research selected by the researchers based on the research topic on which the research is taking place. The research design framework enables the researchers to permit the research methods suitable for the research and reach the study success level (Ahmed et al., 2021). The researcher within this research study aims to give focus on the quantitative research design for approaching the outcomes of the research study. The quantitative research study results, or outcomes are estimated using numerical values. The data analysis states that the Kingdom of Saudi Arabia has measured a significant number of enhancements in the construction site during the last two years (Al-Yami and Sanni-Anibire, 2021). But the people faced the time delaying outcomes, issues in the pricing of the materials used during the construction process, and a more significant amount of waste present during the quality management system. The quantitative study addresses some challenges within the Kingdom of Saudi Arabia’s construction industry (Sarhan et al., 2018).

Quantitative research design: the quantitative research design of the study uses experimental or descriptive analysis for the findings of the data within the study. The 282 construction professionals check the number of participants in conducting the questionnaire survey for the research for analysing the impact of quality in the construction industry. The design uses the CAD tool which stands for Computer-Aided Design to interpret the implementation of the construction in terms of its quality (Sarhan et al., 2017).

Qualitative research design: the qualitative research design of the study uses the observations of the participants for conducting a well-structured and theoretical design relevant to the research study (Bajjou and Chafi, 2018). However, the qualitative desiring included the words and the definition regardless of the statistical norm or the numerical inclusion. The researcher would be choosing qualitative research to investigate the more profound analysis of the systematised review, or the thematic analyzation which will conduct through open-ended questions to gather that data and analyse further the results and findings.

The rationale for Choosing Quantitative Research: This study has been considering the suitable challenges in the QSM implementation due the enabling the researcher to investigate the prevalence and severity of the particular challenges., to determine the correlation among the variables and the statistical analysis (SPSS) that would influence the numerous factors on the implication procedure. The Quantitative data has been delivering a more structured ad quantifiable acknowledgement of the challenges that would be crucial in making information decisions and recommendations.

## Data Collection Process

The data collection procedures are carried out to collect the knowledge or the information depending upon the study's numbers, variables, or theoretical background. The data which is collected aims to give the answers to the research questions of the study (Hadidi et al, 2017). The research questions of the study point out the advantages of the QMS, which is a quality management system in the construction industry within Saudi Arabia and putting the best applications for achieving a successful QMS in a construction site in Saudi Arabia (Sarhan et al., 2018).

Primary data: The questionnaire examines the observations that enable the researchers to contrast the findings of the person’s interpretation through the empirical data. The questionnaire is adopted for the participants’ 1st half and second half. The response from 282 construction professionals is received during the survey (Sarhan et al., 2017). The response generated a percentage ratio of 35%, including the Saudi council engineers, contractors, architects, customers, and project managers. In the first half, the engineers send the online survey invitation to the member receiving the 155 responses, and in the second half give the hard copy of the surveys to the contracting industries or the clients generating a response of 127 people (Sarhan et al., 2018).

Secondary Data: secondary data collection has been involved to gathered and analysing the data that has been already collected and published in articles or the corporation aime rather than the particular research study. The secondary data is collected from books, articles, journals, or other resources depending upon the data collected by the other person (Uhm et al., 2017). This data would come from a variety of resources. This study on the challenges implication as the Quality Management System has been constructing the corporation in the KSA to collect data that would be beneficial.

The rationale for Choosing Primary Data Collection: The primary data collection has been gathering the first gains information directly to the resources through surveys, interviews or observation. This study would be choosing Primary data collection for analysing the challenges in the QMS implication that allow the researchers to tailor the data collection methods to the particular construction corporation in KSA. These techniques will ensure to collection of relevant data, timing and particular to the challenges that I faced by the corporations. In addition, the primary data collection would facilitate a deeper exploration of the challenges and deliver opportunities for clarification and follow the question that encourages the validity and reliability of the study observation.

## Data Analysis

The data analysis procedure has been a critically stepping in the study that would include and extract meaningful insights from the data collection. In the particular study, the primary research has been considered with the questionnaire data analysis that as ben deriving the primary data obtained through the questionnaire survey. This technique would include the usage of a statistical approach to analyse and interpret the numerical data gathered from the respondents. The data analysis identifies the quantitative data analysis for the research study, including the primary data for conducting the questionnaire survey (Blaise, 2019). Variables show the interpretation of the quantitative data that is the inclusive criteria of the research. At the same time, exclusive criteria of the data depict the qualitative data analysis (Elshafey et al., 2020).

## Ethical consideration

The ethical consideration of the research considers the guidance of the research design, which is the quantitative research within the research study (Sarhan et al., 2017). The ethical consideration would be utmost in any research that would ensure the research that is constructed ethically and responsibly. In this case, conducting a quantitative research study uses primary data collection with numerous ethical principles that should be followed.

# CHAPTER FOUR

# Results and Findings

This study has been determined to analyse the significant challenges that would influence the effective implementation of the quality management system in the construction corporation in the Kingdom of Saudi Arabia. To make the questionnaire interview based on the primary qualitative research was constructed in this study due to the better retention of participants. This study will be conducted with 282 respondents who would be agreed to give their answers for the online survey. Moreover, this study has been considered with a 5 Likert scale for better construction of results. This study would be emphasised with the SPSS software for reliability and validity for the appropriate results to achieve the finding. However, this study would be produced descriptive statistics, T-test, regression and reliability statistics.

## Reliability Test

|  |  |  |
| --- | --- | --- |
| **Reliability Statistics** | | |
| Cronbach's Alpha | Cronbach's Alpha Based on Standardised Items | N of Items |
| .078 | .989 | 16 |

The reliability statistics have been reported the consistent with the respondent and the participant. The analysis has confirmed the questionnaire's validity and the search's reliability towards the relationship to the accurate scenario being studied. However, the Cronbach Alpha value has been considered 0.78, which is more significant than 0.6, indicating that this study's data collection has been reliable. The data analysed the consistency of 282 participants who could fill out the Google form, and there were 15 questions in this study. Furthermore, this study has been reliable for future researchers.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Summary Item Statistics** | | | | | | | |
|  | Mean | Minimum | Maximum | Range | Maximum / Minimum | Variance | N of Items |
| Inter-Item Covariances | 2.126 | -.652 | 3.446 | 4.098 | -5.283 | .327 | 16 |
| Inter-Item Correlations | .852 | -.005 | 1.000 | 1.005 | -221.932 | .101 | 16 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ANOVA with Cochran's Test** | | | | | | |
|  | | Sum of Squares | df | Mean Square | Cochran's Q | Sig |
| Between People | | 122579.664 | 281 | 436.227 |  |  |
| Within People | Between Items | 5063184.971 | 15 | 337545.665 | 3168.942 | .000 |
| Residual | 1695307.279 | 4215 | 402.208 |  |  |
| Total | 6758492.250 | 4230 | 1597.752 |  |  |
| Total | | 6881071.914 | 4511 | 1525.398 |  |  |
| Grand Mean = 11.78 | | | | | | |

The analysis of the Cochran test is a non-parametric test for considering the randomised whole design where the respondent variable has binary values. However, if the p-value is less than 0.5, the results would be statistically significant, whereas if the p-value is higher than 0.5, it becomes insignificant. The result shows that the data is statistically significant because the p-value is less than 0.5.

## Analysis of the respondent

This study has been considered with the 5 Likert scale used in this research for collecting the respondent data and conducting on SPSS for the appropriate results. However, the 5 Likert scale has been considered with 1 showing strongly disagree, 2 shows disagree, 3 showing neutral, 4 being considered to agree, and 5 showing strongly agree. The questionnaire has not been considered with a neutral number. Either it was agreeing or disagreeing, or either it was strongly agreeing or strongly disagreeing. However, there were taking 15 questions in response to the questionnaire, which will also show in Appendix 1.

## Frequency Test

The first test has been taken as the frequency statistics, which shows the number of validities, mean, median and mode and the overall deviation for the respondents (See Appendix 2).

## Frequency Table

To take the response to question 1: most of the respondent has been agreed with asking, "Lack of skilled workers in the organisation is a major challenge to effective QMS". the higher respondent, such as 155 response has, been intellectual in favour of Q1, and the 53% of the induvial are agreed.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q1.** | | | | | |
|  | | Frequency | Per cent | Valid Percent | Cumulative Percent |
| Valid | Strongly disagree | 127 | 44.1 | 45.0 | 45.0 |
| Agree | 155 | 53.8 | 55.0 | 100.0 |
| Total | 282 | 97.9 | 100.0 |  |
| Missing | System | 6 | 2.1 |  |  |
| Total | | 288 | 100.0 |  |  |

To take the response to question 2: most respondents Strongly agreed with asking, "Lack of training of workers is a major challenge to the effective QMS implementation". The higher respondent, such as 155 responses, has been intellectual in favour of Q2, and a higher percentage, 54% of participants, has been intellectual with this question.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q2.** | | | | | |
|  | | Frequency | Per cent | Valid Percent | Cumulative Percent |
| Valid | Strongly disagree | 1 | .3 | .4 | .4 |
| Disagree | 127 | 44.1 | 45.0 | 45.4 |
| Strongly agree | 154 | 53.5 | 54.6 | 100.0 |
| Total | 282 | 97.9 | 100.0 |  |
| Missing | System | 6 | 2.1 |  |  |
| Total | | 288 | 100.0 |  |  |

## Regression Analysis

The regression analysis has demonstrated how a change in the independent is linked with the change in dependent variables. Our analysis shows the significant coefficient sum of the squares, which indicates that the value of the independent variable increases due to the principal value of the dependent variable also rising.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ANOVA with Cochran's Test** | | | | | | |
|  | | Sum of Squares | df | Mean Square | Cochran's Q | Sig |
| Between People | | 122579.664 | 281 | 436.227 |  |  |
| Within People | Between Items | 5063184.971 | 15 | 337545.665 | 3168.942 | .000 |
| Residual | 1695307.279 | 4215 | 402.208 |  |  |
| Total | 6758492.250 | 4230 | 1597.752 |  |  |
| Total | | 6881071.914 | 4511 | 1525.398 |  |  |
| Grand Mean = 11.78 | | | | | | |

Descriptive statistics has been summarising the data that could represent the whole data set.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Descriptive Statistics** | | | | | | | |
|  | N | Minimum | Maximum | Mean | Std. Deviation | Kurtosis | |
| Statistic | Statistic | Statistic | Statistic | Statistic | Statistic | Std. Error |
| Q1. | 282 | 1 | 4 | 2.65 | 1.495 | -1.974 | .289 |
| Q2. | 282 | 1 | 5 | 3.63 | 1.501 | -1.966 | .289 |
| Q3. | 282 | 1 | 4 | 2.89 | 1.264 | -1.595 | .289 |
| Q4. | 282 | 1 | 5 | 3.40 | 1.801 | -1.803 | .289 |
| Q5. | 282 | 1 | 4 | 2.89 | 1.265 | -1.604 | .289 |
| Q6. | 282 | 1 | 5 | 3.39 | 1.799 | -1.804 | .289 |
| Q7. | 282 | 1 | 4 | 2.89 | 1.264 | -1.595 | .289 |
| Q8. | 282 | 1 | 5 | 3.39 | 1.804 | -1.812 | .289 |
| Q9. | 282 | 1 | 4 | 2.89 | 1.264 | -1.595 | .289 |
| Q 10. | 282 | 2 | 5 | 3.65 | 1.495 | -1.974 | .289 |
| Q11. | 282 | 1 | 4 | 2.64 | 1.496 | -1.979 | .289 |
| Q12. | 288 | 2 | 5 | 3.66 | 1.484 | -1.952 | .286 |
| Q13. | 282 | 1 | 4 | 2.65 | 1.493 | -1.972 | .289 |
| Q14. | 282 | 2 | 5 | 3.65 | 1.495 | -1.974 | .289 |
| Q15. | 282 | 1 | 4 | 2.65 | 1.495 | -1.974 | .289 |
| Valid N (listwise) | 282 |  |  |  |  |  |  |

All the further frequency table tests will be demonstrated in the Appendix for better construction of the findings and further discussion. Moreover, T-Test and the Pearson correlation test are also included in the Appendix.

# CHAPTER FIVE

# Discussion

The main issues raised in this chapter's discussion about the Kingdom of Saudi Arabia's (KSA) construction organisations' effective adoption of Quality Management Systems (QMS). The chapter thoroughly examines these difficulties, deriving conclusions from the study results discussed in Chapter 4. This debate aims to advance awareness of the obstacles preventing the successful adoption and implementation of QMS in the KSA construction industry by delving into the specifics of these difficulties. However, this study has been successfully measure the respondent activities towards the QMS in the KSA. To take the response to question 3: most respondents Strongly agreed with asking, "Poor communication among various teams in the organisations is a major challenge to the effective QMS implementation". The higher respondent, such as 154 responses, has been intellectual in favour of Q,3, and a higher percentage, 54% of participants, has been intellectual with this question (See Appendix 2). To take the response to question 4: most respondents Strongly agreed with asking, "Top management commitment towards quality is a major challenge to effective QMS implementation". The higher respondent, such as 155 responses, has been intellectual in favour of Q4, and a higher percentage, 55% of participants, has been intellectual with this question (See Appendix 2). To take the response to question 5: most respondents agreed to ask, "Planning of interdisciplinary activities poses a major challenge to the effective QMS implementation". The higher respondent, such as 154 responses, has been intellectual in favour of Q,5, and a higher percentage, 54% of participants, has been intellectual with this question (See Appendix 2). To take the response to question 6: most respondents agreed to ask, "Inadequate resource availability is a major challenge to effective QMS implementation". The higher respondent, such as 154 responses has, been intellectual in favour of Q6, and th,e higher percentage, 54% of participants, has been intellectual with this question (See Appendix 2).

To take the response to question 7: most respondents agreed to ask, "Complex Supply Chain Management is a major challenge to effective QMS implementation". The higher respondent, such as 154 responses, has been intellectual in favour of Q7, and a higher percentage, 54% of participants, has been intellectual with this question (See Appendix 2). To take the response to question 8: most of the respondents Strongly agreed with asking, "Awarding the contract to the lowest bidder is ultimately shall be the major challenge to the effective QMS implementation". The higher respondent, such as 154 responses, has been intellectual in favour of Q8, and a higher percentage, 54% of participants, has been intellectual with this question (See Appendix 2). To take the response to question 9: most respondents agreed to ask, "Resistance to change within the organisation is a major challenge to effective QMS implementation". The higher respondent, such as 154 responses, has, been intellectual in favour of Q9, and a higher percentage 54% of participants, has been intellectual with this question (See Appendix 2). To take the response to question 10: most respondents Strongly agreed with asking, "Code requirement for construction activities is a major challenge to the QMS implementation". The higher respondent, such as 155 responses, has been intellectual in favour of Q10, and the higher per cent, 55% of participants, has been intellectual with this question (See Appendix 2). To take the response to question 11: most respondents agreed to ask, "Complex design during the construction work is a major challenge to the effective QMS implementation". The higher respondent, such as 154 responses, has, been intellectual in favour of Q11, and a higher percentage,54% of participants, has been intellectual with this question.

To take the response to question 12: most respondents Strongly agreed with asking, "Environmental Conditions/ External Factor is a major challenge to the effective QMS implementation". The higher respondent, such as 157 responses, has, been intellectual in favour of Q12, and a higher percentage,54% of participants, has been intellectual with this question (See Appendix 2). To take the response to question 13: most respondents agreed with asking, "Low Salary of Workers is a major challenge to the effective QMS implementation". The higher respondent, such as 154 responses, has, been intellectual in favour of Q13, and a higher percentage, 54% of participants, has been intellectual with this question (See Appendix 2). To take the response to question 14: most respondents Strongly agreed with asking, "Paperwork of quality personnel is a major challenge to the effective QMS implementation". The higher respondent, such as 155 responses, has been intellectual in favour of Q14, and a higher percentage,e 55% of participants, has been intellectual with this question (See Appendix 2). To take the response to question 15: most respondents agreed to ask, "Tight Schedule of Project is a major challenge to the effective QMS implementation". The higher respondent, such as 155 responses, has been intellectual in favour of Q15, and a higher percentage, 5,5% of participants, has been intellectual with this question. Another test has been considered in this study, which is the T-test, that has been implementing the mean of a single prediction of the value that would be determining the sample mean that has been significant with the graters or less the values; however, the P-value has been lesser than 0.5 which indicating that the T-test is statistically significant for this study. Similar to the discussion, orienting the QMS system has been considered a crucial part of the construction industry until it would be helped in the project and compliance with success and client satisfaction. As the Mohamed Essam Shaawat et al., (2023) reveals that the benchmarking for the implication has been efficient in the management and the procedure of control around the numerous industries and the sectors with the ISO 9000 series that would be determined with the QMS model that has been supporting the proponents of the quality management. these construction companies had embraced the model that would support ISO 9001. The numerous advantages that have been considered with a framework in the simplest version of their operations are discussed in the discussion. To standardise the process. With a client-focused mindset. The study has been emphasised with the professionals affiliated with the ISO-TC 176 that had significantly contributed to the agreements of the skills and knowledge in developing ISO 9001 standards. As per Ali, Al-Sulaihi and Al-Gahtani, (2013), the Partnership has been invaded with the grounded research that has been developing in the construction sectors to the profound form the wider used and the success of QMS model that has been constructed in the industry of the KSA that has been larger in the quick version of the enhancing sectors. This study will deceased the copro atonal culture in the organisational techniques in the labour and material supply chain, and the management skills have been distinctive and give the industry a competitive advantage in the construction market. According to the study (Hamad Almujibah, 2023), similar to the literature on the QMS, the KSA construction has been scared off compared to the other regions. The construction period would be acknowledging the essential quality management systems that have been outcoming in the generation and executing the systems and techniques. This study will also be considered the development of proficient quality management, and it would be considered the quality profile that has been related to the corporation, which has been critical in the unsatisfactory management with the delivery outcomes. In contrast, this stud has been discussing the regression analysis towards the analysis of the efficient TQM in the KSA construction sectors that would be focused on dimension management, quality control and the assurance of discoveries with quality management and the assurance of positive influence on the project with the whole quality. This study will also discuss and assert that developing and implementing a standardised Quality Management System (QMS) within an organisation requires effective information system management, quality reporting documentation, meticulous recording of quality-related data such as inspections and identified issues, and collaboration among stakeholders to address these issues and ensure intended quality control. Furthermore, Riaz et al. (2023) emphasised the critical requirement to supply quality projects and services in the Saudi construction sector, which involves effectively implementing a Quality Management System (QMS). Nonetheless, the Saudi construction industry's unique peculiarities render conventional QMS recommendations inapplicable. The study has been discussing the challenges that had been linked with the implementation of MS has been constructing with the construction that would be posted on significant managers' challenges. Meanwhile, the QMS has been potentially addressing the long-lasting problems in the construction that would be hindering the prevalence of systems. As () reveals, in contrast, that the higher cost of the QMS would be deterred with the simplified enterprises from embracing the potential benefits. As per (Yaser Hasan Al-Mamary, 2022), the larger barrier has been revealed with the construction that would be adopted n the QMS. these reasons would be considered in their investigation of the QMS in the corporation that has been efficient towards the construction process. This study would also emphasise adopting the challenges from the pre-existing quality management system in the KSA that would be constructing the corporation to enhance the empirical consideration. However, this study has been found as the prior obstacle towards implementing the techniques and approaches in the areas of the corporation that have been implemented in the QMS to be classified into two major categories: organisation and cultural strategy. This study would face several challenges from the corporation: a desire to resolve a management tendency in favour of constructions as the least tendency. Furthermore, this study has emphasised the insufficient direction to project teams, which is critical in ensuring staff members have the necessary knowledge and acclimation to the Quality Management System (QMS) standards, which may contribute to the capacity deficit (). However, according to (Yusuf, 2023), the issue of management commitment in the construction industry is tied to two factors: the requirement for senior management to recognise the benefits of implementing a QMS and senior management's tendency to emphasise time and budgets over quality. According to (Faqihi and Shah Jahan Miah, 2023), lack of awareness and expertise have been identified as key barriers to establishing a QMS in the construction business. Furthermore, (Naif Al Azmi et al., 2022) investigated the primary challenges to developing a QMS in the construction sector. This study will discuss the major barriers towards adopting the QMS that has been efficient with the communication, which has been requiring the successful implementation of the QMS inside and outside the corporation. As per (Bernardus Ariono, Meditya Wasesa and Wawan Dhewanto, 2022) poor communication in discussion with the construction of the sectors is ascribed to the absence of knowledge and resources. The insufficient training and the miscommunication between the staff members due to the challenges have been highlighted by the atrial perception of QMS application that would be causing the distribution of lower productivity with the multicultural working environment that has been leading to discrepancies in the QMS resistance to the current practices. Many studies have been referring to the construction organisation where it would discuss the quality performance in the construction manufacture. The procedures have been designed for the manufacturer as ben profound under the particular standards towards achieving satisfaction and the value-added investment. Similar to the context, sustainable construction has projects to the desire towards finishing under the quality of finished under the construction cost and the time. Moreover, the construction phase has been considered with the measurement o the reconstruction project performance. The construction phase has been followed with standardised mutual agreements over the project participation included in the construction project sharing with the distinctive aspect across the quality (Badr Alsolami, 2022). Quality is influenced by project owner requirements, project environment, project manager, project methodologies, and project management. Research has revealed several aspects that influence quality and specify various performance metrics, which are described further in future research. The main performance indicators for quality and their implications are not well-defined for these projects. Therefore, many inputs are relied on unstructured expert judgement, causing substantial disputes between owners and contractors. A structured and well-defined procedure is necessary to determine the impact of quality elements on project performance. A strategy like this would help decision-makers minimise their impact during the planning stage. Owners require accurate historical performance data from all past projects to aid decision-making throughout the bidding stage. A performance quality index (PQI) framework must be developed to assist decision-makers in assessing the performance of contractors in the sustainable building area during the project's construction phase.

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Appendix 2

Pearson Correlation

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Correlations** | | | | | | | | | | | | | | | | |
|  | | Q1. | Q2. | Q3. | Q4. | Q5. | Q6. | Q7. | Q8. | Q9. | Q 10. | Q11. | Q12. | Q13. | Q14. | Q15. |
| Q1. | Pearson Correlation | 1 | .987\*\* | .963\*\* | .983\*\* | .960\*\* | .980\*\* | .963\*\* | .974\*\* | .963\*\* | 1.000\*\* | .993\*\* | .999\*\* | .999\*\* | 1.000\*\* | 1.000\*\* |
| Sig. (2-tailed) |  | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 |
| N | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 |
| Q2. | Pearson Correlation | .987\*\* | 1 | .959\*\* | .970\*\* | .963\*\* | .978\*\* | .959\*\* | .982\*\* | .959\*\* | .987\*\* | .999\*\* | .993\*\* | .993\*\* | .987\*\* | .987\*\* |
| Sig. (2-tailed) | .000 |  | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 |
| N | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 |
| Q3. | Pearson Correlation | .963\*\* | .959\*\* | 1 | .897\*\* | .999\*\* | .898\*\* | 1.000\*\* | .895\*\* | 1.000\*\* | .963\*\* | .962\*\* | .964\*\* | .964\*\* | .963\*\* | .963\*\* |
| Sig. (2-tailed) | .000 | .000 |  | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 |
| N | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 |
| Q4. | Pearson Correlation | .983\*\* | .970\*\* | .897\*\* | 1 | .894\*\* | .998\*\* | .897\*\* | .991\*\* | .897\*\* | .983\*\* | .976\*\* | .982\*\* | .982\*\* | .983\*\* | .983\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 |  | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 |
| N | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 |
| Q5. | Pearson Correlation | .960\*\* | .963\*\* | .999\*\* | .894\*\* | 1 | .898\*\* | .999\*\* | .898\*\* | .999\*\* | .960\*\* | .964\*\* | .963\*\* | .963\*\* | .960\*\* | .960\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 |  | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 |
| N | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 |
| Q6. | Pearson Correlation | .980\*\* | .978\*\* | .898\*\* | .998\*\* | .898\*\* | 1 | .898\*\* | .998\*\* | .898\*\* | .980\*\* | .981\*\* | .982\*\* | .982\*\* | .980\*\* | .980\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 |  | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 |
| N | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 |
| Q7. | Pearson Correlation | .963\*\* | .959\*\* | 1.000\*\* | .897\*\* | .999\*\* | .898\*\* | 1 | .895\*\* | 1.000\*\* | .963\*\* | .962\*\* | .964\*\* | .964\*\* | .963\*\* | .963\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 |  | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 |
| N | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 |
| Q8. | Pearson Correlation | .974\*\* | .982\*\* | .895\*\* | .991\*\* | .898\*\* | .998\*\* | .895\*\* | 1 | .895\*\* | .974\*\* | .983\*\* | .978\*\* | .978\*\* | .974\*\* | .974\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 | .000 |  | .000 | .000 | .000 | .000 | .000 | .000 | .000 |
| N | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 |
| Q9. | Pearson Correlation | .963\*\* | .959\*\* | 1.000\*\* | .897\*\* | .999\*\* | .898\*\* | 1.000\*\* | .895\*\* | 1 | .963\*\* | .962\*\* | .964\*\* | .964\*\* | .963\*\* | .963\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 |  | .000 | .000 | .000 | .000 | .000 | .000 |
| N | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 |
| Q 10. | Pearson Correlation | 1.000\*\* | .987\*\* | .963\*\* | .983\*\* | .960\*\* | .980\*\* | .963\*\* | .974\*\* | .963\*\* | 1 | .993\*\* | .999\*\* | .999\*\* | 1.000\*\* | 1.000\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 |  | .000 | .000 | .000 | .000 | .000 |
| N | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 |
| Q11. | Pearson Correlation | .993\*\* | .999\*\* | .962\*\* | .976\*\* | .964\*\* | .981\*\* | .962\*\* | .983\*\* | .962\*\* | .993\*\* | 1 | .997\*\* | .997\*\* | .993\*\* | .993\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 |  | .000 | .000 | .000 | .000 |
| N | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 |
| Q12. | Pearson Correlation | .999\*\* | .993\*\* | .964\*\* | .982\*\* | .963\*\* | .982\*\* | .964\*\* | .978\*\* | .964\*\* | .999\*\* | .997\*\* | 1 | 1.000\*\* | .999\*\* | .999\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 |  | .000 | .000 | .000 |
| N | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 288 | 282 | 282 | 282 |
| Q13. | Pearson Correlation | .999\*\* | .993\*\* | .964\*\* | .982\*\* | .963\*\* | .982\*\* | .964\*\* | .978\*\* | .964\*\* | .999\*\* | .997\*\* | 1.000\*\* | 1 | .999\*\* | .999\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 |  | .000 | .000 |
| N | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 |
| Q14. | Pearson Correlation | 1.000\*\* | .987\*\* | .963\*\* | .983\*\* | .960\*\* | .980\*\* | .963\*\* | .974\*\* | .963\*\* | 1.000\*\* | .993\*\* | .999\*\* | .999\*\* | 1 | 1.000\*\* |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 |  | .000 |
| N | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 |
| Q15. | Pearson Correlation | 1.000\*\* | .987\*\* | .963\*\* | .983\*\* | .960\*\* | .980\*\* | .963\*\* | .974\*\* | .963\*\* | 1.000\*\* | .993\*\* | .999\*\* | .999\*\* | 1.000\*\* | 1 |
| Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 |  |
| N | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 |
| \*\*. Correlation is significant at the 0.01 level (2-tailed). | | | | | | | | | | | | | | | | |

Frequency test

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Statistics** | | | | | | | | | | | | | | | | |
|  | | Q1. | Q2. | Q3. | Q4. | Q5. | Q6. | Q7. | Q8. | Q9. | Q 10. | Q11. | Q12. | Q13. | Q14. | Q15. |
| N | Valid | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 288 | 282 | 282 | 282 |
| Missing | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 0 | 6 | 6 | 6 |
| Mean | | 2.65 | 3.63 | 2.89 | 3.40 | 2.89 | 3.39 | 2.89 | 3.39 | 2.89 | 3.65 | 2.64 | 3.66 | 2.65 | 3.65 | 2.65 |
| Median | | 4.00 | 5.00 | 4.00 | 5.00 | 4.00 | 5.00 | 4.00 | 5.00 | 4.00 | 5.00 | 4.00 | 5.00 | 4.00 | 5.00 | 4.00 |
| Mode | | 4 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 4 |
| Std. Deviation | | 1.495 | 1.501 | 1.264 | 1.801 | 1.265 | 1.799 | 1.264 | 1.804 | 1.264 | 1.495 | 1.496 | 1.484 | 1.493 | 1.495 | 1.495 |
| Variance | | 2.236 | 2.254 | 1.597 | 3.245 | 1.600 | 3.236 | 1.597 | 3.256 | 1.597 | 2.236 | 2.239 | 2.203 | 2.230 | 2.236 | 2.236 |
| Kurtosis | | -1.974 | -1.966 | -1.595 | -1.803 | -1.604 | -1.804 | -1.595 | -1.812 | -1.595 | -1.974 | -1.979 | -1.952 | -1.972 | -1.974 | -1.974 |
| Std. Error of Kurtosis | | .289 | .289 | .289 | .289 | .289 | .289 | .289 | .289 | .289 | .289 | .289 | .286 | .289 | .289 | .289 |

Frequency Table

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q3.** | | | | | |
|  | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Strongly disagree | 57 | 19.8 | 20.2 | 20.2 |
| Disagree | 70 | 24.3 | 24.8 | 45.0 |
| Neutral | 1 | .3 | .4 | 45.4 |
| Agree | 154 | 53.5 | 54.6 | 100.0 |
| Total | 282 | 97.9 | 100.0 |  |
| Missing | System | 6 | 2.1 |  |  |
| Total | | 288 | 100.0 |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q4.** | | | | | |
|  | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Strongly disagree | 70 | 24.3 | 24.8 | 24.8 |
| Disagree | 57 | 19.8 | 20.2 | 45.0 |
| Strongly agree | 155 | 53.8 | 55.0 | 100.0 |
| Total | 282 | 97.9 | 100.0 |  |
| Missing | System | 6 | 2.1 |  |  |
| Total | | 288 | 100.0 |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q5.** | | | | | |
|  | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Strongly disagree | 57 | 19.8 | 20.2 | 20.2 |
| Disagree | 71 | 24.7 | 25.2 | 45.4 |
| Agree | 154 | 53.5 | 54.6 | 100.0 |
| Total | 282 | 97.9 | 100.0 |  |
| Missing | System | 6 | 2.1 |  |  |
| Total | | 288 | 100.0 |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q6.** | | | | | |
|  | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Strongly disagree | 70 | 24.3 | 24.8 | 24.8 |
| Disagree | 57 | 19.8 | 20.2 | 45.0 |
|  |  |  |  |  |
| Strongly agree | 154 | 53.5 | 54.6 | 100.0 |
| Total | 282 | 97.9 | 100.0 |  |
| Missing | System | 6 | 2.1 |  |  |
| Total | | 288 | 100.0 |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q7.** | | | | | |
|  | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Strongly disagree | 57 | 19.8 | 20.2 | 20.2 |
| Disagree | 70 | 24.3 | 24.8 | 45.0 |
|  |  |  |  |  |
| Agree | 154 | 53.5 | 54.6 | 100.0 |
| Total | 282 | 97.9 | 100.0 |  |
| Missing | System | 6 | 2.1 |  |  |
| Total | | 288 | 100.0 |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q8.** | | | | | |
|  | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Strongly disagree | 71 | 24.7 | 25.2 | 25.2 |
| Disagree | 57 | 19.8 | 20.2 | 45.4 |
| Strongly agree | 154 | 53.5 | 54.6 | 100.0 |
| Total | 282 | 97.9 | 100.0 |  |
| Missing | System | 6 | 2.1 |  |  |
| Total | | 288 | 100.0 |  |  |



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q 10.** | | | | | |
|  | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Disagree | 127 | 44.1 | 45.0 | 45.0 |
| Strongly agree | 155 | 53.8 | 55.0 | 100.0 |
| Total | 282 | 97.9 | 100.0 |  |
| Missing | System | 6 | 2.1 |  |  |
| Total | | 288 | 100.0 |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q11.** | | | | | |
|  | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Strongly disagree | 128 | 44.4 | 45.4 | 45.4 |
| Agree | 154 | 53.5 | 54.6 | 100.0 |
| Total | 282 | 97.9 | 100.0 |  |
| Missing | System | 6 | 2.1 |  |  |
| Total | | 288 | 100.0 |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q12.** | | | | | |
|  | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Disagree | 127 | 44.1 | 44.1 | 44.1 |
| Agree | 4 | 1.4 | 1.4 | 45.5 |
| Strongly agree | 157 | 54.5 | 54.5 | 100.0 |
| Total | 288 | 100.0 | 100.0 |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q13.** | | | | | |
|  | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Strongly disagree | 127 | 44.1 | 45.0 | 45.0 |
|  |  |  |  |  |
| Agree | 154 | 53.5 | 54.6 | 100.0 |
| Total | 282 | 97.9 | 100.0 |  |
| Missing | System | 6 | 2.1 |  |  |
| Total | | 288 | 100.0 |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q14.** | | | | | |
|  | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Disagree | 127 | 44.1 | 45.0 | 45.0 |
| Strongly agree | 155 | 53.8 | 55.0 | 100.0 |
| Total | 282 | 97.9 | 100.0 |  |
| Missing | System | 6 | 2.1 |  |  |
| Total | | 288 | 100.0 |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q15.** | | | | | |
|  | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Strongly disagree | 127 | 44.1 | 45.0 | 45.0 |
| Agree | 155 | 53.8 | 55.0 | 100.0 |
| Total | 282 | 97.9 | 100.0 |  |
| Missing | System | 6 | 2.1 |  |  |
| Total | | 288 | 100.0 |  |  |

T Test

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **One-Sample Statistics** | | | | |
|  | N | Mean | Std. Deviation | Std. Error Mean |
| Q1. | 282 | 2.65 | 1.495 | .089 |
| Q2. | 282 | 3.63 | 1.501 | .089 |
| Q3. | 282 | 2.89 | 1.264 | .075 |
| Q4. | 282 | 3.40 | 1.801 | .107 |
| Q5. | 282 | 2.89 | 1.265 | .075 |
| Q6. | 282 | 3.39 | 1.799 | .107 |
| Q7. | 282 | 2.89 | 1.264 | .075 |
| Q8. | 282 | 3.39 | 1.804 | .107 |
| Q9. | 282 | 2.89 | 1.264 | .075 |
| Q 10. | 282 | 3.65 | 1.495 | .089 |
| Q11. | 282 | 2.64 | 1.496 | .089 |
| Q12. | 288 | 3.66 | 1.484 | .087 |
| Q13. | 282 | 2.65 | 1.493 | .089 |
| Q14. | 282 | 3.65 | 1.495 | .089 |
| Q15. | 282 | 2.65 | 1.495 | .089 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **One-Sample Test** | | | | | | |
|  | Test Value = 0 | | | | | |
| t | df | Sig. (2-tailed) | Mean Difference | 95% Confidence Interval of the Difference | |
| Lower | Upper |
| Q1. | 29.750 | 281 | .000 | 2.649 | 2.47 | 2.82 |
| Q2. | 40.656 | 281 | .000 | 3.635 | 3.46 | 3.81 |
| Q3. | 38.449 | 281 | .000 | 2.894 | 2.75 | 3.04 |
| Q4. | 31.704 | 281 | .000 | 3.401 | 3.19 | 3.61 |
| Q5. | 38.369 | 281 | .000 | 2.890 | 2.74 | 3.04 |
| Q6. | 31.680 | 281 | .000 | 3.394 | 3.18 | 3.60 |
| Q7. | 38.449 | 281 | .000 | 2.894 | 2.75 | 3.04 |
| Q8. | 31.518 | 281 | .000 | 3.387 | 3.18 | 3.60 |
| Q9. | 38.449 | 281 | .000 | 2.894 | 2.75 | 3.04 |
| Q 10. | 40.981 | 281 | .000 | 3.649 | 3.47 | 3.82 |
| Q11. | 29.610 | 281 | .000 | 2.638 | 2.46 | 2.81 |
| Q12. | 41.882 | 287 | .000 | 3.663 | 3.49 | 3.84 |
| Q13. | 29.750 | 281 | .000 | 2.645 | 2.47 | 2.82 |
| Q14. | 40.981 | 281 | .000 | 3.649 | 3.47 | 3.82 |
| Q15. | 29.750 | 281 | .000 | 2.649 | 2.47 | 2.82 |