# A Critical Analysis of Project Quality Management in High-Rise Buildings in Malta: Perspectives of Project Managers

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**FACULTY/INSTITUTE/CENTRE/SCHOOL** Built Environment

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# Dedication

This work is dedicated to Charmaine, who inspired me to commence and successfully conclude this project.

**Acknowledgements**

I thank God for blessing me with the gifts of endurance and courage, which enabled me to complete my dissertation. I want to express my heartfelt gratitude to everyone who helped me in various ways during my dissertation project. My sincere gratitude is due to my supervisor, Dr. Joseph H. Spiteri, B.E.&A.(Hons), MSc. (Edin.), Ph.D. (Leeds), for his unwavering support and advice in completing my dissertation. I would like to express appreciation to all of the lecturers who have taught and aided me since the beginning of this course. I would also like to acknowledge all the participants who gave up their valuable time to answer my interview questions to the best of their abilities. Without their invaluable contributions, my dissertation's study and successful completion would not have been feasible.

I would also like to thank my partner Charmaine for her ongoing support, motivation and encouragement during this journey. I want to express my gratitude to my parents, whose constant love and support have served as the foundation for my academic aspirations.

**Abstract**

The increasing number of high-rise buildings in Malta presents new challenges and opportunities for the local construction industry. High-rise structures in Malta spark disputes from proponents and detractors. The 21st-century Maltese construction sector struggles with quality, productivity, safety, schedule adherence, and cost overruns. This raised the need to explore the current success factors and barriers to quality in high-rise building project work, particularly in Malta. Malta's high-rise building development has also made project quality management a priority for project managers. Against this background, this study set out to create new understandings of project quality management in the setting of high-rise buildings from the viewpoints of six project managers in Malta.

The study employed a qualitative methodology, utilising the combined framework of Total Quality Management and Kaizen Philosophies. The inquiry into the lived experiences of six project managers was carried out by means of individual face-to-face semi-structured interviews. The synthesis of primary research data suggests that the management of project quality in high-rise construction projects in Malta can be improved by implementing ten key factors. These factors include meeting client expectations, investing in a competent quality management team, engaging consultants and contractors with the appropriate mindset, and involving the project manager from the early stages. Additionally, it is important to foster a culture that prioritises a collective and continuous commitment to achieving excellence in construction quality management. This can be achieved by shifting the mindset of everyone involved. Furthermore, it is crucial to develop the capabilities, knowledge, and skills of all stakeholders through ongoing training and professional development. Also, effective communication among project managers and stakeholders at all levels is essential for efficient coordination. This dissertation offers significant insights for further research, policy development, and practical application.

**Keywords:** Project Quality Management, Project Management, High-Rise Buildings, Project Manager

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# Glossary

| Abbreviations | Meaning |
|---|---|
| BIM | Building Information Modeling |
| BREEAM | Building Research Establishment Environmental Assessment Method |
| CPM | Critical Path Method |
| ESG | Environmental, Social, and Corporate Governance |
| EVA | Earned Value Management |
| FAR | Floor Area Ratio |
| H&S | Health and Safety |
| ISO | International Standards Organisation |
| ITP | Inspection Test Plan |
| LEED | Leadership in Energy and Environmental Design |
| MSP | Microsoft Projects |
| NCRs | Non-Conformance Reports |
| PDCA | Plan-Do-Check-Act |
| PERT | Planning and Evaluation Review Technique |
| PMBOK | Project Management Body of Knowledge |
| PMI | Project Management Institute |
| QA | Quality Assurance |
| QC | Quality Control |
| QMP | Quality Management Planning |
| QMS | Quality Management System |
| TA | Thematic Analysis |
| TQM | Total Quality Management |
| WBS | Work Breakdown Structure |

# Chapter 1: Introduction

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## 1.1 Context and Rationale

In recent decades, the building industry in Malta has witnessed a significant surge in activity and substantial expansion (European Commission, 2021). The advent of high-rise buildings in Malta introduces novel problems and opportunities for the local construction industry. At present, Malta has a limited number of high-rise structures. There is a growing trend of tall buildings planned for future development or currently in construction. High-rise buildings in Malta continually give rise to debates that encompass viewpoints from advocates as well as detractors. The current surge in construction, including high-rise buildings in Malta, has brought project quality management in large-scale projects into focus for project managers (National Production Board, 2020; Zammit, 2022).

The importance of quality is evident in all facets of our existence. Consumers constantly seek enhanced quality in products and elevated standards of excellence. The construction industry has long been plagued by issues of low productivity and inefficiency (Barbosa et al., 2017). The limited evolution of the construction business over numerous centuries somewhat accounts for this phenomenon (Buswell et al., 2007). The building sector is presently witnessing a transformation in client expectations, characterised by a high need for intricate and pioneering endeavours that conform to high standards of excellence. Therefore, assessing the present practices utilised in the construction industry is imperative. According to Jamali and Oveisi (2016), the project manager assumes the responsibility of detecting, evaluating, and managing project risks in order to ensure the effective delivery of the project.

Based on my personal experience in construction project management within the context of low and high-rise structures in Malta, the present circumstance gives rise to a multitude of arguments and inquiries, particularly the significance of project quality management in the high-rise construction sector. Do project operations conducted in high-rise structures conform to established standards in order to improve quality or prioritise cost constraints? Is a quality management system frequently regarded as a supplementary expenditure? Who are the key stakeholders accountable for mitigating errors and rework, hence

contributing to substandard quality management? To what extent does the role and experience of the project manager impact the performance of project quality, and which abilities hold the utmost significance? The experiences of project managers in the context of highrise development in Malta have not yet been thoroughly investigated through scientific research.

It is within this context, along with my personal and professional experiences that sparked a keen interest in investigating the issues surrounding the attainment of high-quality outcomes in high-rise building projects within the local context of Malta. This research study set out to critically analyse project quality management through the first-hand accounts of project managers actively engaged in the construction sector of tall buildings. The definition of high-rise buildings in this study is in accordance to the Floor Area Ratio (FAR). A high-rise building is classified as one having ten or more stories.

## 1.2 Aim of the Study

The aim of this research is to explore novel insights into project quality management in the context of high-rise structures, specifically focusing on the perspectives of six project managers in Malta. This particular setting is deemed worthy of investigation due to its relative novelty and the potential for valuable research outcomes. The present study aims to offer valuable insights into the experiences of project managers - a bottom-up perspective - in the realm of project quality management within the context of large-scale projects. It seeks to reveal the highs and lows experienced by these project managers in their quest for effective project quality management in high-rise buildings. It also explores the origins of the issues affecting quality across the project life cycle.

## 1.3 Objectives

The following is an overview of the objectives that illustrate how the study intends to achieve its actual aim:

- To identify how project managers define quality management in a high-rise building.
- To explore how project managers working in high-rise buildings in Malta: define the role of the project manager; identify the skills they deem most important for this role; and implement/practice quality management systems.
- To explore how the three project quality management processes - planning quality, quality management/assurance, and quality control - are featured in the projects experienced by project managers working in highrise buildings in Malta.
- To find out how standards feature in a Maltese highrise buildings context.
- To identify the successes, challenges, and prospects of project managers with experience in highrise buildings in Malta concerning project quality management.
- To provide new insights from the dialogues with project managers and highlight implications for future policy, research and practice in the built environment.

## 1.4 The Research Question Guiding My Study

Drawing upon the context of this study, the identified gap in knowledge, my professional background as a project manager, and the formulation of assumptions derived from theoretical perspectives found in the existing literature, I was able to refine and identify the primary question that guided my research. This question served as a pivotal element that connected me to various aspects, including the selection of the methodological approach employed in this research:

***What can we learn about project quality management in high-rise buildings from the perspectives of project managers in Malta?***

The measurement of quality differs from that of time or cost, rendering the quantification of quality a challenging endeavour. The decision to employ a qualitative methodology was based on its suitability for capturing the comprehensive and insightful narratives provided by project managers. This approach was deemed most effective in addressing the research question at hand in this study.

## 1.5 Dissertation Structure

This dissertation presents a narrative that originated from my initial thoughts, opinions, and assumptions. The factors mentioned above had significant implications for my research interests, which underwent a gradual evolution and ultimately culminated in the selection of a specific study area. This process was influenced and refined through a literature review, formulation of research questions, adoption of theoretical views, and determination of appropriate methodological approaches and methods. The following part outlines the organisational framework of the dissertation being presented:

This initial chapter provides the introductory aspects of the subject matter at hand. The introduction commences by providing an overview of the research objective, which aims to acquire novel perspectives on quality management in high-rise constructions, specifically from the vantage point of project managers in Malta. Additionally, the study will offer contextual information and justification, elucidating the reasons for the selection of this particular issue. The concluding section of the chapter provides a comprehensive summary of the organisational framework employed in the dissertation.

In Chapter 2, a critical review is conducted of the relevant literary sources. The literature review will be synthesised, and a gap in knowledge will be identified. The outcome narrows down to the proposed research methodology. Chapter 3 presents the methodology adopted in this research. This section will provide a comprehensive explanation of how the study design was developed in order to address the identified research topic. The chapter provides an account of the epistemological position, theoretical perspective, research methodology, specific research methods and analysis procedures employed.

Chapter 4 presents the findings, analysis, and discussion of this study in the context of a literature review. Emerging findings and perceptions from the interviews are obtained from the deductive and inductive approaches to analysis conducted. Chapter 5 provides a comprehensive overview, highlighting the principal discoveries that address the research questions posed in this investigation.

## 1.6 Chapter Summary

This chapter provides an introduction to the background, objectives, and justification of the present investigation, which support the selection of the research topic. Furthermore, my developed theoretical perspectives facilitated the process of identification of my study domain and the formulation of the research question. This prompted me to select the conceptual and theoretical frameworks and establish an explicit research strategy and appropriate fieldwork methods. The methodology employed facilitated the delineation of the scope of this research endeavour to make a substantive contribution to the extant body of knowledge. The following chapter presents a literature review relevant to the principles of this research in accordance with the research questions explored in this study.

# Chapter 2: Literature Review

# Chapter 2: Literature Review

## 2.1 Chapter Introduction

Various factors and variables influence project quality management in construction, also when it comes to high-rise buildings (Alias et al., 2014). The literature review is framed within three key concepts (Figure 1) that emerge from the research question:

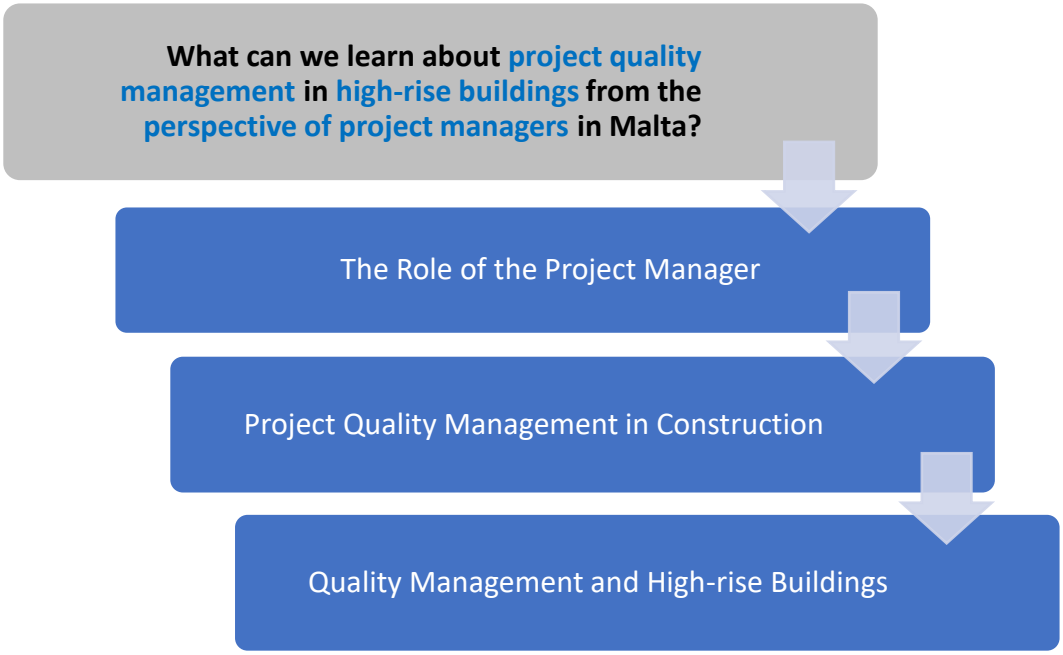


***Figure 1 Conceptual framework of the study – emerging from the research question***

The following sections present the literature review based on the framework identified above. This study adopts a dual theoretical lens – Total Quality Management (TQM) and Kaizen.

## 2.2 Theoretical Underpinnings

TQM and Kaizen are two essential principles that are closely associated with the ongoing enhancement of quality, the establishment of standardised methods for task completion, and the overall performance within an organisation.

### 2.2.1 Total quality management: A management philosophy

TQM is a leading theory or management philosophy underpinning the study's conceptual framework (Deming, 1986). This quality assurance theory strongly focuses on product quality and contends that excellent operational performance will boost customer satisfaction and continual improvement (Aoieong et al., 2002; Shao et al., 2012). The theory holds that every employee in a company may improve the organisation's working culture by enhancing its products, processes, and services (Femi, 2015; Othman et al., 2020). In this light, Saleem et al. (2012) explain that the TQM idea incorporates a dual approach, including both top-down and bottom-up strategies, hence the involvement of both top management and workers in the process. According to Patel and Pitroda (2021), TQM focuses on ensuring that errors are minimised by applying standards, guidelines, and process requirements. Benefits of TQM might include lower quality expenses and increased employee job satisfaction (Pheng, 2004). The Plan-Do-Check-Act (PDCA) cycle, often referred to as the Shewhart Cycle or the Deming Cycle, is a widely utilised problem-solving tool within the context of TQM. This study centres on the topic of project quality management. To comprehensively explore this subject, the interview questions posed to the six project managers in Malta were structured using the sequential technique of the PDCA cycle, which is firmly rooted in TQM. The aim was to enhance comprehension and insight into project quality management.

### 2.2.2 The Kaizen philosophy

The term "Kaizen" originates from Japan and refers to the practice of making minor, ongoing improvements as a regular part of an organisation's operation (Chen et al., 2000). The research clearly indicates that the Kaizen philosophy (Masaaki, 1986), also known as continuous improvement, is a fundamental component of Deming's TQM (Deming, 1986). Paraschivescu and COTÎRLEȚ (2015) identify three key elements of the Kaizen: (1) the importance of customers, (2) the need to manage processes, and (3) the quality chain. Hyland et al. (2004) and Imai (1997) define Kaizen as self-discipline to boost productivity and efficiency, a positive work environment and job satisfaction, quality circles to generate

suggestions for improvement and problem-solving, waste elimination, lead time, and the Kaizen 5S (Sort, Set in order, Shine, Standardise, and Sustain) framework to maintain excellent housekeeping. The 5S method is a very efficient tool for arranging and optimising the workplace. It aids in the implementation of kaizen initiatives by establishing a clean, secure, and productive environment. Brunet and New (2003) claim that people must go beyond their assigned roles in order to participate in Kaizen strategy, which involves continuously finding and creating better ways to accomplish everyday tasks and improving organisational performance. Figure 2 below shows that unlike TQM, the Kaizen idea adheres to a bottom-up strategy - the employees propose recommendations for enhancement (Saleem et al., 2012).


***Figure 2 Kaizen cycle for continuous improvement***

*Source: https://www.techtarget.com/searchcio/definition/Total-Quality-Management*

The Kaizen theory exerted a significant influence on the present study, as it seeks to investigate the domain of project quality management in relation to the active participation of workers in high-rise construction projects conducted in Malta.

The following sections will unpack the three concepts that underline this work – the role of the project manager, project quality management in construction, and quality management and high-rise buildings.

## 2.3 The Role of the Project Manager in High-Rise Building

The role of the project manager is essential when it comes to a project's quality performance (Kulej-Dudek, 2021). Crawford (2004) highlights that for every project to be successful, the roles and responsibilities of the project manager are essential, starting from the planning and design stage, continuing with the execution and controlling, and concluding with the closure of the project. According to PRINCE2 (Projects in Controlled Environments), the role of a project manager is to provide direction, management, and control to ensure that a project is delivered within its agreed time, cost, and quality constraints (Basu, 2014; Gelbtuch & Morlan, 2015; Wideman, 2002). Gaddis (1959) was the first to publish an article on the project manager's responsibilities. He designated the primary responsibilities of the project manager as delivering the final product in accordance with performance requirements, within the constraints of the allocated budget, and within the specified timeframe. He determined that the project manager must be a skilled communicator who can discuss budgets and technology issues and therefore be schooled in multiple disciplines and skills.

In order to properly engage with various stakeholder groups, it is imperative for a project manager to possess a comprehensive understanding of how to proficiently utilise data and evaluate outcomes (Demirkesen & Ozorhon, 2017). Gaining a comprehensive understanding of the processes that will be impacted by the project is an essential component of effective planning. According to Murphy and Ledwith (2007), individuals are likely to develop improved decision-making abilities, expedite project progress, and effectively execute project guidelines and procedures. According to Kumar et al. (2019), managing resources, handling a competitive climate, and transforming information are all current examples of relevant managerial skills. Furthermore, the findings revealed by Hanna et al. (2018) indicate that the project manager's performance depends on the ability of knowledge and experience to implement leadership and effective management

decisions and cognition during the project cycle. In the context of high-rise buildings, Talukhaba (1999) argues that projects are complex and require efficient project management to ensure successful completion. Recent research stresses that the project manager is ultimately in charge and responsible for the project's quality management to ensure that standards are met (Kerzner, 2017; Patel & Pitroda, 2021). This evidence sheds light on the significance of the project manager's involvement in the successful execution of high-rise building construction projects.

A good management system is necessary for completing projects on schedule, within budget, and with high quality (Pheng & Chuan, 2006). Jha and Iyer (2006) discovered that the project manager's competency and top management assistance and support might significantly improve a construction project's quality performance. It is also stated that the project manager is the key person in charge of allocating resources and making decisions at the site, in line with a set of rules upheld by top management (Jha & Iyer, 2006). The Project Management Institute (PMI) has defined a set of required competencies and skills that project management professionals must possess to lead projects, programmes, and portfolios that help organisations accomplish their strategic objectives (Gelbtuch & Morlan, 2015). Turner (2016) also stated that project managers need to balance three skill sets to be most effective. As specified in his book (PMI), the 'Talent Triangle' has three categories - strategic and business management, technical project management and leadership.

Project managers' success relies heavily on their leadership skills (Baker, 2018). Baker (2018) states that leadership is the main driver behind all quality management processes. Further, he claims that project managers can benefit from strong leadership abilities in various ways, such as; effective communication, decision-making, problem-solving, motivation and vision to work towards a common goal. These competencies enable project managers to manage the people and resources involved in a project effectively and to ensure that it is completed on time, within budget, and to the required quality standards (Huljenic et al., 2005). In this light, Pollack et al. (2018) capture the most significant connections – Time, Cost and Quality – as the 'Iron Triangle' framework underpinning leadership for quality management processes. The project manager must be able to align the project with the organisation's overall strategy and ensure that the project delivers

value to the business. The strategies determine how well a company achieves its goals while meeting client needs, as a large portion of that responsibility depends on how successfully administrators carry out their duties (Fuertes et al., 2020). Companies achieve objectives successfully when project management is acknowledged as an integral component of strategy execution (Nieto-Rodriguez, 2013). A recent study highlights that future studies should devote more attention to human resource management, emphasising people and their soft skills (Peric et al., 2021). The present study aims to address this knowledge gap by examining the role of human resource management in individuals' experiences and the practical use of soft skills in managing project work within high-rise structures.

The literature in this section highlights the critical role of the project manager in project quality management. Ongoing expansion and innovation in construction bring about changes requiring project management experience (Knoepfel, 1989). Technical know-how and the ability to adapt to a changing business environment are requirements for project managers whose abilities, backgrounds, attitudes, and behaviours are slowly evolving; thus, they must rely on information and abilities gained through training and practical experience (Hills et al., 2008). Seymour and Hussein (2014) indicate that project managers need a unique set of skills, which is now generally acknowledged. They claim that the difficulties project managers face will change along with organisations. It was also explained that the core qualities that create a successful project manager would remain the same, such as leadership, pragmatism, decisiveness, communication, and foresight, to mention just a few. Seymour and Hussein (2014) conclude that the future might demand project managers to adapt by learning new specialised skills. Such scholarly evidence on the role of the project manager in construction, including the evolving context of high-rise buildings, guided me in choosing project managers as participants in this study.

## 2.4 Project Management

In order to effectively implement project management, it is necessary to establish a clear definition of the term "project." According to the findings of Turner and Müller (2003), a project can be described as a transitory undertaking that has a specific commencement

and conclusion aimed at generating a distinctive product, service, output, or result. Cirtina et al. (2014) and Kerzner (2017) defined a project as a series of tasks and activities with a predetermined objective, a focus on generating business value, and a specific deadline within specified specifications.

Almost every organisation emphasises project management (Kloppenborg & Opfer, 2002). Cartlidge (2015) found that project management relies on creating and achieving realistic goals. According to Cartlidge (2015), project management involves defining, planning, executing, controlling resources, and closing the project within its acceptance criteria and charter limits. The planning, monitoring, and regulating of all parts of the project and the motivation of all individuals involved in it to achieve the project objectives on time and to the stipulated cost, quality, and performance is project management, according to PRINCE2 (Turley, 2010). Atkinson (1999) defines project management as a wide range of duties, procedures, tools, and approaches. Project management is approached from numerous aspects, yet they are all related. The 2018 PMBOK® Guide defines "project management as the application of knowledge, skills, tools and techniques to project activities to meet project requirements" (Dionisio, 2017, p. 10). The PMBOK also lists eight interrelated knowledge categories (Table 1) that support project management process groups and may be needed in most projects throughout the life cycle. Project quality management (No. 8 in Table 1) is the focus of this study.

| Knowledge Areas | Project Management Process Groups | | | | |
|---|---|---|---|---|---|
| | Initiating Process Group | Planning Process Group | Executing Process Group | Monitoring and Controlling Process Group | Closing Process Group |
| 4. Project Integration Management | 4.1 Develop Project Charter | 4.2 Develop Project Management Plan | 4.3 Direct and Manage Project Work<br>4.4 Manage Project Knowledge | 4.5 Monitor and Control Project Work<br>4.6 Perform Integrated Change Control | 4.7 Close Project or Phase |
| 5. Project Scope Management | | 5.1 Plan Scope Management<br>5.2 Collect Requirements<br>5.3 Define Scope<br>5.4 Create WBS | | 5.5 Validate Scope<br>5.6 Control Scope | |
| 6. Project Schedule Management | | 6.1 Plan Schedule Management<br>6.2 Define Activities<br>6.3 Sequence Activities<br>6.4 Estimate Activity Durations<br>6.5 Develop Schedule | | 6.6 Control Schedule | |
| 7. Project Cost Management | | 7.1 Plan Cost Management<br>7.2 Estimate Costs<br>7.3 Determine Budget | | 7.4 Control Costs | |
| 8. Project Quality Management | | 8.1 Plan Quality Management | 8.2 Manage Quality | 8.3 Control Quality | |
| 9. Project Resource Management | | 9.1 Plan Resource Management<br>9.2 Estimate Activity Resources | 9.3 Acquire Resources<br>9.4 Develop Team<br>9.5 Manage Team | 9.6 Control Resources | |
| 10. Project Communications Management | | 10.1 Plan Communications Management | 10.2 Manage Communications | 10.3 Monitor Communications | |
| 11. Project Risk Management | | 11.1 Plan Risk Management<br>11.2 Identify Risks<br>11.3 Perform Qualitative Risk Analysis<br>11.4 Perform Quantitative Risk Analysis<br>11.5 Plan Risk Responses | 11.6 Implement Risk Responses | 11.7 Monitor Risks | |
| 12. Project Procurement Management | | 12.1 Plan Procurement Management | 12.2 Conduct Procurements | 12.3 Control Procurements | |
| 13. Project Stakeholder Management | 13.1 Identify Stakeholders | 13.2 Plan Stakeholder Engagement | 13.3 Manage Stakeholder Engagement | 13.4 Monitor Stakeholder Engagement | |

***Table 1 Project management process group and knowledge area mapping comparing***

*Source PMBOK® (Project Management Institute, 2017)*

This study aims to provide a deeper analysis of project quality management, specifically focusing on the strategies employed by project managers in ensuring quality during the planning and execution stages of high-rise building projects in Malta.

## 2.5 Project Quality Management in Construction

### 2.5.1 Defining quality

One cannot discuss project quality management without mentioning construction quality. Construction quality definitions are complicated, according to Hoonakker et al. (2010). Harvey and Green (1993) classified the several definitions of construction quality into five groups: exception, perfection, fit for use, value for money, and transformative. Recently, ISO 9000 defines quality as "the degree to which a set of inherent characteristics fulfils requirements" (ISO 9000 [18]) (PMBOK Guide 2017, p274). When all initial project requirements are completed, a project meets its quality objectives (Baccarini, 1999). Thus, stakeholders are satisfied with the product or service. Businesses must constantly review, evaluate, and improve their operations to satisfy customers and produce high-quality goods and services (Baccarini, 1999). Quality might be performance to standards or value paid, according to Abas et al. (2015), or compliance to specifications. They also say quality is a key construction project key performance indicator that can cause cost overruns and schedule delays. Jraisat and Hattar (2016) discovered in three studies that quality can be used to repair errors, reduce waste, and achieve the owner's expectations, such as functionality, within time and budget. This study will analyse "quality" in high-rise construction engineering as compliance to a requirement or customer satisfaction.

### 2.5.2 The importance of project quality management in the construction industry

Project quality management refers to the systematic approach of overseeing and upholding quality standards throughout the duration of a project (Leong et al., 2014). According to Turner et al. (1999), the foremost objective of project quality management is to ensure that the project adequately fulfils the needs for which it was originally conceived.

The PMBOK® (Project Management Institute, 2017) similarly states that project quality management encompasses the necessary procedures to guarantee that the project fulfils the predetermined requirements and objectives. Furthermore, it delineates the three fundamental components of project quality management as quality planning, quality assurance (QA), and quality control (QC). Quality may improve everything from operators' satisfaction to the project's and building's safety (Chen, 2019). Project quality management in the building sector is crucial for customer satisfaction, Health and Safety compliance, and risk reduction (Smallwood, 2005). High-quality construction ensures consumer, employee, and public safety (Törner 2009). Sui Pheng and Tan (1996) state that construction safety depends on an unaltered planning, design, and tendering process, high-quality materials and good workmanship practices, and strict compliance with construction norms and regulations to avoid disputes and risks.

Aichouni et al. (2014) claim that quality management assurance frameworks like TQM and the standards that result from reducing, detecting, and eliminating errors, along with their tools and techniques, can improve product quality, process improvement, profits, savings, and customer satisfaction. The adoption of many quality techniques and approaches has emphasised construction quality (Metri, 2005). Sustainability is also crucial for construction quality (Zhai et al., 2014). Like most endeavours, building construction involves time, effort, and thorough process monitoring to achieve the desired quality (Asfoor et al., 2022).

Quality costs money and affects profits. Poor quality almost always affects project profitability by requiring more management effort to fix errors, more reworks, more H&S issues, unsuitable for the purpose, and a loss of time and materials (Jha, 2004). The building industry has struggled to meet quality standards (Elattar, 2009). Inefficiency and poor quality will be reflected in the waste of time, money, and resources annually (Abas et al. 2015). The complexity of a building project increases as it grows and customers seek higher quality at lower prices and within budget (Femi, 2015). Such literature suggests researching project quality management in Malta's growing high-rise development context. This study tries to advance understanding through project manager perspectives.

### 2.5.3 Project quality management processes

Although often misunderstood or poorly applied, project quality management is crucial to any project (Rever, 2007). All project-related operations are efficient and effective in achieving project goals and results through project quality management. PMBOK Guide (2017) defines project quality management as three processes that integrate the organization's quality policy into project planning, management, and control (Figure 3). Each process group has several inputs, tools, procedures, and outputs. Project managers must integrate the right tools at each stage (Patanakul et al., 2010).

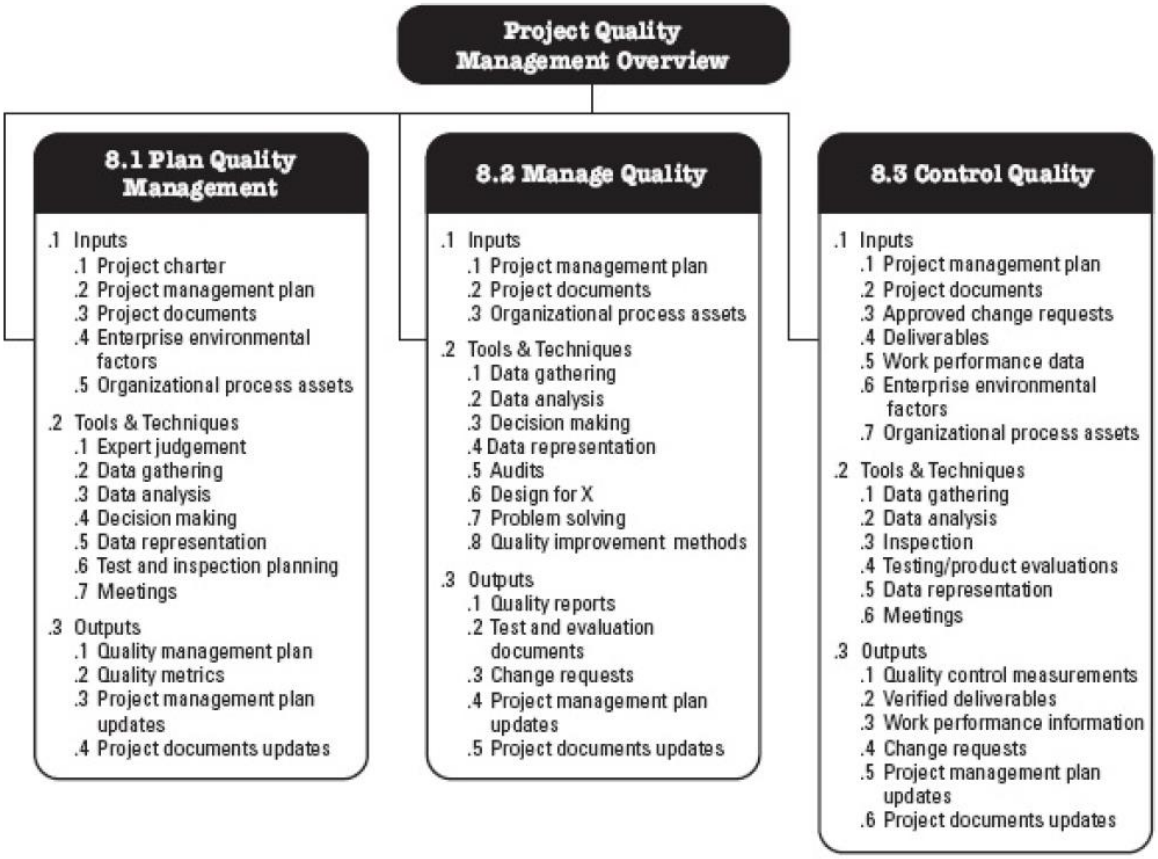


***Figure 3: The three processes underpinning project quality management***

*Source: PMBOK 6th Edition (2017)*

The subsequent content provides a concise overview of the three fundamental processes that form the foundation of project quality management (Figure 3):

### 2.5.3.1 Plan quality management.

The plan is the most important link in quality management. The quality plan comprises quality management objectives and work strategies for quality assurance. Poor planning, risk management and communication processes will lead to project failure (Zwikael & Globerson, 2004). A quality management plan is intended to define the processes, policies, procedures, and activities that will be implemented to ensure that a project, product, or service satisfies the specified quality standards of requirements, reduce rework and enhance efficiency (Fegade & Bhangale, 2016). The primary objective of a quality management plan is to establish the approach for QA activities throughout the project life cycle, benchmarking and the processes and activities to monitor the QC (Figure 4; Cirtina et al., 2014).

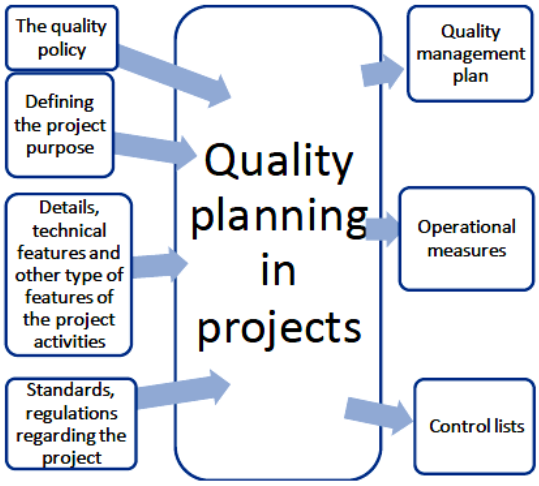


***Figure 4 Quality planning in projects as a major process***

*Source Cirtina, Cîrţînă, & Luca (2014).*

The quality management plan contains inputs like the project charter, which sets clear and achievable project goals and determines the project's brief (Kelly et al., 2003). All project team members, stakeholders, and quality assurance professionals should follow this guide. Project briefs outline a project's goals, scope, restrictions, and needs (Kelly et al., 2003; Othman, 2004). It describes the project's goals, timeframes, budget, resources, deliverables, team members' roles, and procurement instructions. It also helps identify value management, potential risks, problems, and restrictions that could affect project success and establish mitigation methods, according to Othman et al. (2005). The RIBA

work plan promotes early and strict brief creation and adherence (Hughes, 2003). Product quality standards and requirements are set during quality planning to meet stakeholder goals. This study will examine how Maltese high-rise project managers used standards. Wood and Oldfield (2008) report that some tall buildings are trying to set an example by earning the highest sustainability ratings from LEED, BREEAM, Green Star, or CASBEE. ISO certification improves building projects (Moatazed-Keani & Ghanbari-Parsa Sechi, 1999). Setting standards is not enough because QA improves processes and QC monitors projects. This depends from the management performance, which is the second concept to be discovered.

### 2.5.3.2 Quality assurance and quality control

QA and QC are two critical processes that help ensure product or service quality. While QA helps prevent defects from occurring in the first place, QC helps detect and correct any defects. Figure 5 shows the different concepts and processes of QA (proactive) and QC (reactive) and the common benefits that the project will gain before, during and after the implementation stages (Prince 2).

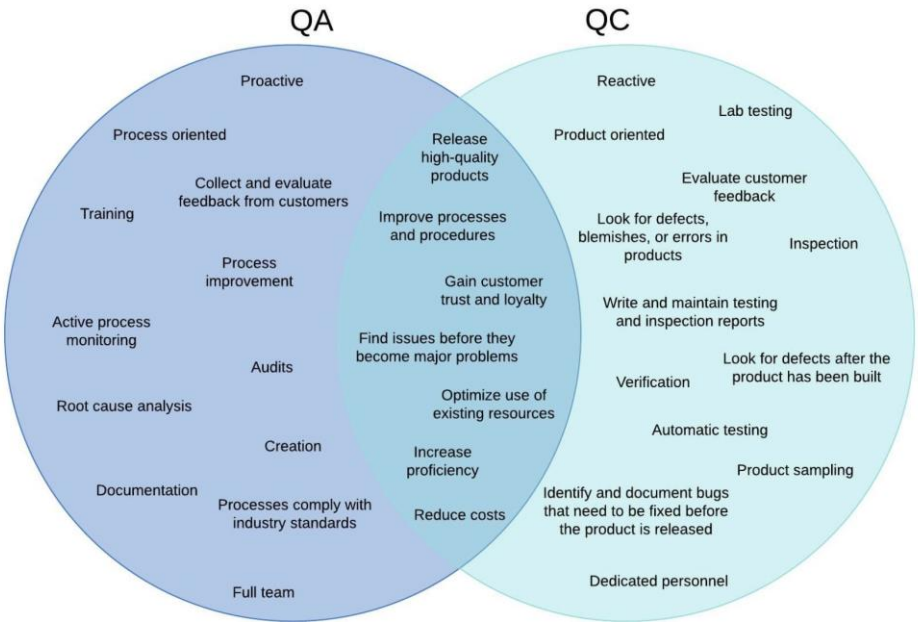


***Figure 5 QA and QC processes and common benefits during the quality management process***

*Source (Prince 2) (Bhoraniya, 2018)*

According to Chung, (2002), QA audits quality criteria and QC are process measurements to guarantee correct quality standards. This technique simplifies project quality management through continuous improvement. By implementing both QA and QC processes, companies can ensure that their products or services meet the desired level of quality, which can help build customer trust and loyalty and ultimately lead to business success (Salvi & Kerkar, 2020).

#### 2.5.3.2.1 Quality assurance (or managing quality)

Quality Assurance or Managing Quality entails converting a quality management strategy/plan into actionable activities incorporating the organization's quality standards into the project. Also referred to as QA, managing quality has a greater scope, according to the PMBOK Guide (2017). According to ISO 9001:2015, quality management is the result of considering customer expectations, legislative requirements, and internal organisational criteria. QA in project management guarantees that product or service processes fulfil quality standards (Patel & Pitroda, 2021). The same authors also defined QA as all the planned, methodical operations within the quality system to ensure the project meets quality requirements and prevents faults and errors. When goals or criteria are not met, corrective action should be implemented.

Bubshait and Al-Atiq (1999) claimed that a contractor's quality assurance system ensures constant quality, preventing faults and their recurrence. Their assessment shows that most contractors lack quality system documentation. The project manager and team may use the quality assurance department or other organisational functions for controlled quality activities, including failure analysis, design, and quality improvement. Project documentation, including QC measurement lessons from prior projects, is utilised to assess project procedures and deliverables (Dement'eva et al., 2018). Quality improvements might emerge from quality audits, QC methods, or management quality process problem-solving. Two of the most popular quality improvement techniques to analyse and assess areas for improvement are PDCA and Six Sigma (Pheng & Hui, 2004; Ren et al., 2015). Any modifications made throughout the management quality process that could influence the

project management plan or the scope, schedule, or cost baseline due to a particular quality management activity must be documented and updated.

#### 2.5.3.2.2 Quality control

QC implements QA requirements on building sites. QC involves monitoring project results to assure quality, finding solutions, and removing causes of poor performance (Ashokkumar, 2014). Childs-Johnson (2012) said high-rise building engineering has higher standards than normal construction engineering. Therefore, management needs are more complex and advanced. Since this study focused on high-rise construction, QC was crucial.

The QC process checks if project results meet aims (Flynn et al., 1994). Defects and construction alterations might come from poor QC or site supervision (Iwaro & Mwashan, 2012). QC also monitors and analyses quality operations to evaluate performance and make changes. QC improves standards, root cause mitigation, and error prevention (Rumane, 2017). Rumane (2017) also notes that QC and cost management work together in advance planning after standards are set during pre-construction to reduce costly mistakes during construction. QC procedures are performed during planning, contractor selection, contract details/specifications, construction, mock-ups, façade and compliance scrutiny, and testing and commissioning (Guillaume et al., 2018). The construction process is controlled from start to completion.

As one can observe, quality management provides numerous opportunities to improve every element of a project and the business delivering it (Sullivan, 2011). Aichouni et al. (2014) indicated that the best companies frequently use quality management in construction projects to ensure effective project execution and meet expectations and standard requirements. The management of quality deserves the personal focus and dedication of senior management since it is essential to the survival of the organisation (Jha & Iyer, 2006). It must be the workers' primary responsibility to ensure quality. The client, the design team, and the contractor comprise the trio of key actors whose

interactions and relationships significantly impact how well a construction project performs (Ashford, 2002).

The significance of these three stages - project planning, assurance/management, and control - in guaranteeing project quality management in high-rise projects is apparent. Based on my professional experience within the construction industry, it is my belief that project managers would benefit from a deeper comprehension of these processes in order to enhance the efficacy of project quality management. This anecdotal account contributes to the rationale behind selecting project managers as participants and structuring the interview questions around elements derived from the three project quality management processes. The subsequent parts will examine the influence of quality cost on the three processes: quality planning, quality assurance, and quality control. Additionally, these sections will explore how strategies (techniques) and tools are integrated into these processes.

## 2.6 Cost of Quality

To achieve quality, the project will incur a cost, which is referred to as the cost of quality. Ashford (2002) and Arditi and Guanjdin (1997) explain that there are three types of cost:

- Cost of conformance covers all expenses incurred during the product's life cycle, such as quality control, quality assurance, training of staff, monitoring and documentation.
- Cost of non-conformance relates to the money lost due to project failures both during and after completion, such as reworks, scrap costs, loss of business and reputation, liabilities and warranty.
- Prevention cost, which includes the cost of improved design or maintenance cost.

Similarly, Aoieong et al. (2002) categorise failure, prevention, and appraisal as the three primary sources utilised for quantifying quality cost. It is imperative for project managers to possess knowledge regarding the many forms of costs in order to effectively communicate with clients and prevent any potential flaws in the project execution

(Ashford, 2002; Arditi & Guanjdin, 1997). This study attempts to better understand quality cost among project managers in Malta who possess experience in the construction of high-rise buildings.

Crosby (1979) claims that quality is free and pays off. Quality is almost free if the payback outweighs the cost, as it usually is. Process flaws can be reduced by enhancing quality, according to Crosby (1979). Depending on the conditions, the new technique may cost more or less, but it will reduce defects and pay off. According to Atkinson (1999), quality is perceived as time-consuming, but low manufacturing quality causes rework. Poor product delivery causes replacement expenses, client disputes, and reputational damage. Quality saves time and more over time. Poor quality in building projects increases costs by 6–15% owing to rework and waste (Nokulunga et al., 2019). According to Love et al. (1999), measuring quality cost can help users understand rework and preventive measures. Therefore, rework measurement helps improve future performance by gaining insights from past experiences. Kannimuthu et al. (2019) argue that prolonging the procedure can save costs while increasing quality. Hampson et al. (2001) found that poor site supervision owing to lack of expertise and training is a major cause of rework, which negatively influences construction project performance. Reworks can result from owner scope changes, design flaws, and building practices, according to Hwang et al. (2009). Love and Li (2000) illustrate in Figure 6 how a high-quality investment can reduce rework and save money over time.

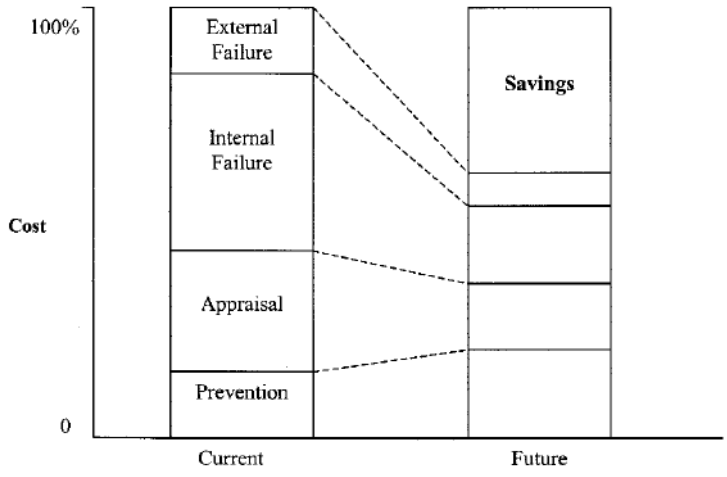


***Figure 6 Indicative savings arising from investing in quality***

*Source (Love & Li 2000)*

Rework charges are now so common in construction that contracting organisations include time and expense overrun clauses in their procurement procedures (Love & Li, 2000). Hwang et al. (2009) found that owners' average construction rework cost was 5% for all projects. In contrast, quality control in engineered construction costs 1–5% of the project budget (Kazaz & Birgonal, 2005). The same article found that poor quality wastes a lot of time, money, and resources each year. Such information suggests that construction businesses must carefully track and manage rework expenses to reduce their influence on project budget and timing. The scholarly work in this area illuminates how the notion of rework includes both necessary rework due to client changes and needless rework due to development errors.

Based on a comprehensive analysis of relevant literature, the present findings clearly demonstrate that allocating resources towards quality control, operational benchmarking, and defect avoidance yields superior outcomes compared to the wastage of resources and the subsequent loss of business and reputation. This assertion aligns with the viewpoint expressed by Love et al. (2018). The selection of appropriate management strategies and tools should also be taken into account. This topic will be further elaborated upon in the subsequent sections.

## 2.7 Construction Quality Management Strategies and Tools

Quality management methods and quality tools have been extensively employed by construction businesses in order to ensure the successful completion of projects (Aichouni et al., 2014). Aichouni et al. (2014) conducted a study which revealed that the application of quality management techniques, such as ISO 9001, and the use of quality tools, such as flow charts, checklists, and cause and effect diagrams, are hindered by the inherent barrier of organisational culture. This section will primarily examine the ISO 9001 standards and the PDCA approach for quality management systems.

### 2.7.1 ISO9001 standards and PDCA approach

ISO 9001 standards provide a framework for creating and implementing a quality management system (QMS) to improve customer satisfaction and deliver high-quality products and services that fulfil market and legal requirements (Rybski et al., 2017). These standards will help companies build a quality culture that promotes continuous improvement, comprehensive quality management, and business goals (Abas et al., 2015). ISO 9000 standards give essential recommendations. Abdel-Razek (1998) states that an ISO-certified quality management system improves financial standards, employee performance, awareness, quality control and assurance systems, training methods, research and development, employee participation, documentation, communication, and information systems.

The seven ISO 9001: 2015 quality management principles lay the groundwork for a successful quality management system. These principles are customer focus, leadership, people engagement, process approach, improvement, evidence-based decision-making, and relationship management. Abuazza, et al. (2020) illustrate these seven concepts with targeted audit constraints, client complaints, and twelve management tools. PDCA, one of ISO 9001: 2015's twelve management tools (Abuazza et al., 2020), is a prominent TQM problem-solving tool. The PDCA process approach methodology, often known as Deming's circle, is used to manage processes and the system as a whole, emphasising risk-based thinking to seize opportunities and avoid negative consequences (Sokovic et al., 2010). Figure 7 shows how the PDCA cycle requires an ongoing search for better ways to develop (Sokovic et al., 2010).

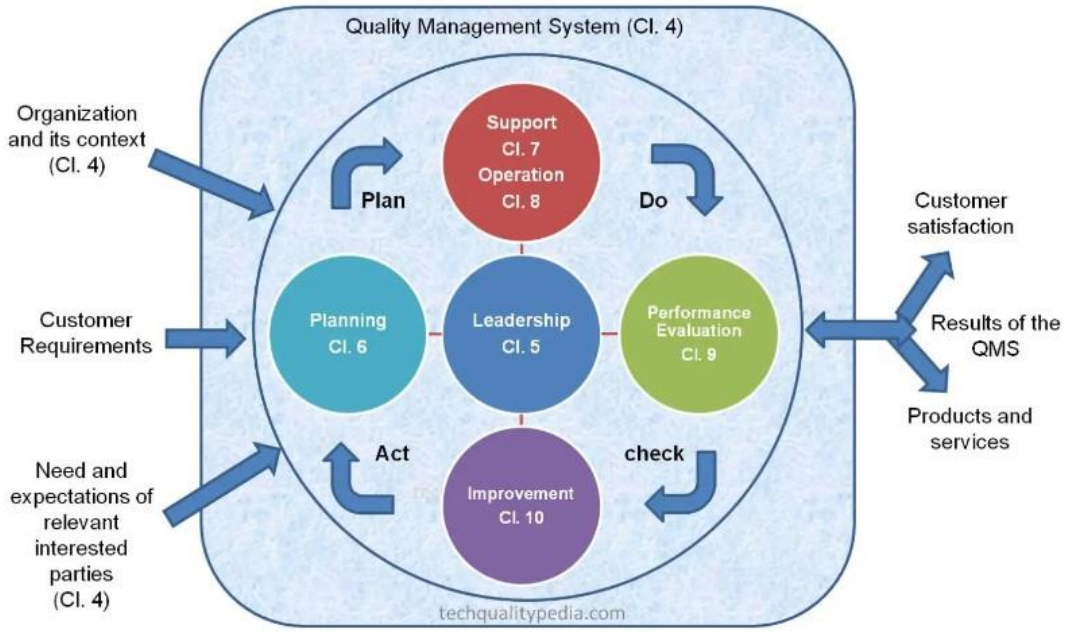


***Figure 7 ISO 9001 quality management system PDCA approach***

*Source https://techqualitypedia.com/iso-9001*

Breaking any of the links in Figure 7 above will lower project quality. The process method helps quality management systems understand and meet requirements, consider added value processes, optimise process performance, and improve procedures based on data. PDCA can be used in all processes and the quality management system (Sokovic et al., 2010). Ren et al. (2015) demonstrate how project management uses the PDCA cycle quality management as a dynamic control principle. The above information supports my use of the PDCA cycle for most interview questions (Appendix A) to project managers who have firsthand experience implementing quality management procedures in high-rise building construction.

### 2.7.2 Project management tools and techniques

Numerous tools and procedures are essential to increasing productivity, minimising waste, detecting problems, and making changes, which are central to this process. As explained earlier in this chapter, the use of TQM and the Kaizen cycle support the philosophy of continuous improvement and customer satisfaction, which is the core of quality

management. This objective may be attained by demonstrating awareness of and employing a diverse range of effective tools and methodologies in every endeavour (Rever, 2007). Project Management is the application of a set of tools and techniques, such as the critical path method (CPM) and matrix organisation, to direct the use of diverse resources towards the completion of a unique, complex, one-time assignment within the constraints of time, cost, and quality (PMI).

Several tools and techniques were identified as part of the implementation process, like cost-benefit analysis and benchmarking (Chin-Keng, 2011). Abdel-Hamid and Abdelhaleem (2019) stated that organisations use quality tools to enhance their operations and increase customer satisfaction. They identified seven core quality tools; Check Sheet, Histogram, Pareto Chart, Fishbone Diagram, Control Chart, Flowchart, and Scatter Diagram. These tools are used at various stages of the process to control quality issues, identify fundamental causes of defects, and make decisions based on evidence and data. Henry Gantt created a planning and monitoring chart in 1917, which served as a stepping stone for developing two new tools (Caughron & Mumford, 2008). The first was the planning and evaluation review technique (PERT), and the second was the critical path method (CPM). In addition, during the 1960s, the terms work breakdown structure (WBS) and earned value analysis (EVA) came into use (Baker, 2018). Following the process of WBS, using Microsoft Projects (MSP) facilitates the segregation of the project's tasks. Generally, high-rise projects are divided into many sub-projects or levels of deliverables before being reduced to a single delivery (Rianty et al., 2018). Since high-rise construction is complicated, Balakina et al., (2018) highlight that a more sophisticated and complete collection of tools must be employed for design, planning, and construction management. Risks related to design errors and construction errors can be reduced by the use of Building Information Modeling (BIM). The BIM-cloud has the potential to increase a quality management process' efficacy while also saving a company time and money (Nguyen et al., 2018). The potential benefits of utilising BIM techniques are the provision of visualisation of construction work, such as optimising the operation of the crane, preparing the construction, and decreasing construction-related mistakes and rework, which will save time and money (Zghari, 2013).

The significance of tools and procedures in quality management within the construction industry cannot be overstated. In the current dynamic and highly competitive market environment, businesses have the potential to cultivate enduring success by embracing these strategies, thereby attaining a competitive advantage, establishing a strong reputation, and achieving long-term prosperity in the context of high-rise constructions. The subsequent section will concentrate on quality management in high-rise buildings, taking into account the dynamic nature of the construction landscape in Malta, which serves as the framework for this study.

## 2.8 Quality Management and High-Rise Buildings

### 2.8.1 Causes and effects of low-quality management and high-rise buildings

This literature review section focuses on the relationship between quality management and high-rise structures. The causes and effects of poor quality management in a project's life-cycle – whether it is a high-rise building or not - are one of a project manager's main concerns during the project's construction and finishing stages (Ashokkumar, 2014). Poor quality management in a project life-cycle can significantly negatively affect the project's success. Some consequences of poor quality management are unsatisfied customers, defects, rework, delays, and cost overruns (Love et al., 2018; Wang et al., 2021).

Fegade and Bhangale (2016) indicate that defects in high-rise buildings can be caused by wrong planning, quality of material, wrong equipment, lack of trained workforce, and methodology used during construction. In the same way, according to Alwi et al. (1999) and Fromsa et al. (2020), the defects in high-rise buildings are caused due to inadequate project management, poor communication, a lack of supervision, experience of workers, unclear requirements, unavailability of tools and equipment and low worker motivation are all fundamental causes of poor workmanship on the job site. Poor quality control or low quality of workmanship can lead to construction defects and reworks, which in turn causes time overruns (Kazaz et al., 2012). The main problems during construction, as identified by Sun et al. (2020), were an absence of coordination and communication between stakeholders, an increase in costs, a lack of information and competence, an

absence of construction norms and standards, poor supply chain integration and the difficulty of connectivity. Chauhan et al. (2009) explain that the main factors that affect quality are due to: time overlap between design and construction; changes to the contract; manpower and level of skills of construction management personnel and labour force; turnover of workers; the availability of materials; inappropriate construction techniques; the quality of equipment and raw materials; and rework as a result of construction mistakes. Yan (2019) confirmed that qualified materials guarantee the project's quality in high-rise buildings, so the materials department should prepare the project material procurement plan per the project's construction plans and drawings to ensure that the project's quality meets the contract.

Construction operations, especially the erection of high-rise buildings, are generally fraught with danger and various challenges. The complex and dynamic nature of high-rise building development activities may be at the root of the elevated risk factors. Any errors or defects in the building process might result in expensive delays, safety risks, and other problems. Chouksey et al. (2020) states that a delay is a failure to finish a project within the allotted time, which compromises both the budget and the quality of the delivery. The most critical causes that lead to delays during the construction of high-rise buildings are poor project planning, lack of experience/ skills, design changes, financial problems, poor labour productivity, lack of resources, poor project management and materials cost increase by inflation (Sambasivan & Soon, 2007). High-rise building construction is time-consuming due to the large number of workers needed and the high cost of the materials. These also include a lack of competency and professionalism, resulting in a lack of detail regarding thorough planning and decision-making.

Fang (2017) talked about how important it is to manage the quality of high-rise building projects. According to the findings of an empirical study, the primary factor impacting risk management is the workplace (Gamayunova & Spitsov, 2020). On the same vein (Pheng et al., 2019) revealed that high-rise construction projects require efficient control of crucial variables, including safety. It is assumed that all the elements, including the physical features, organisational factors, design concerns, quality factors, and safety protection, as well as the work environment and health and safety (H&S), are taken into consideration (Raamkumar & Indhu, 2022). Chauhan et al. (2009) note that the risk of damage by a

natural disaster is higher than a low-rise building due to the size of such a building. Construction companies may guarantee that a building is built to the highest quality standards, design requirements, and safety standards by implementing strict quality control methods (Fegade & Bhangale, 2016). As a result, higher standards and criteria for technical and people quality must be satisfied. Construction methods and standards for high-rise buildings are crucial for efficient management and structural strength. Voskresenskaya and Vorona-Slivinskaya (2018) emphasised that a set of standards should be used to protect high-rise buildings and infrastructure from operational and financial-industrial influences. If a structure is poorly constructed, the building would not be safe, and therefore materials used in construction must meet the structure's requirements (Thapa et al., 2013). For instance, the requirements for the many concrete elements during the construction of high-rise buildings are substantially greater than the requirements for conventional construction (Verma, 2021).

It was also discovered that it might be challenging to modify the design to account for neglected details at the end of a project. Early design decisions are, therefore, crucial to achieving a building's desired performance. For example, the façade design and production quality characteristics must be assessed, monitored, controlled, and improved to ensure that a high level is consistently fulfilled, final appearance and performance (Chung & Mutis, 2020). The engineering systems of high-rise structures should be planned in line with modern high-rise construction standards to provide integrated security, increase energy efficiency, and reduce resource utilisation during construction and management. Dixit and Sharma (2019) noted that time overruns have been reported to be rather common for most projects, and in some cases, cost overruns are also evident in the majority of high-rise building projects. Inaccurate productivity estimates and design errors or change of scope are factors that contribute to reworks which create time and cost overruns (Han et al., 2013).

In the case of high-rise buildings, Yan (2019) indicated that quality management system can be improved and depends on the calibre of staff and supervision, the level of project quality management, the project's smooth and high-quality construction, the environment's safety and security for its inhabitants, and the economic and social benefits of construction projects. Highrise construction projects need effective management and

supervision on the job site, good safety management and practice implementation, a competent manager or supervisor, good communication and coordination, high-quality materials, experienced workers, clear objectives and goals, and good support from senior staff or management (Hadi et al., 2022). On the same line, a study on high-rise buildings by Zainal et al. (2019), stated that the key success criteria for project management in high-rise structures during construction are an extensive understanding of the job and process, correct decisions, leadership, the capacity to coordinate and the ability to motivate workers, contractor experience, effective method of planning and scheduling plus communication. The same research study presents the data analysis ranking related to failure factors for project management on high-rise buildings, which include financial difficulties, unskilled or incompetent site workers, poor project management, inadequate feasibility. Given the data above and my experience working in high-rise projects, this study examines Malta's high-rise project managers' lived experiences to generate new understandings of project quality managment.

## 2.9 Chapter Summary

This literature review tries to lay out project manager roles and skills in high-rise building projects. It also discusses project quality management, its methods, the costs of quality, and quality management strategies throughout the project lifetime. The literature shows that project quality management in an organisation is vital to both the corporate and project levels. Attention should be paid to the causes and effects of poor management in high-rise construction projects, which can lead to rework and delays in time and cost. Quality management includes both product and service delivery, which leads to customer satisfaction. The gaps in knowledge identified in this literature review process has been carefully considered to identify the research question of this study and produce a data collection approach to best answer it. Section 3 describes a qualitative research study that used semi-structured interviews with six project managers to collect primary data.

# Chapter 3 Methodology

# Chapter 3: Methodology

## 3.1. Chapter Introduction

This chapter's objective is to present the selected research design to justify this study's epistemological position, theoretical viewpoints, methodology, and methods. The participant recruitment process, the research questions and the procedures for data collection and analysis are covered in this chapter. This study's ethical concerns will all be discussed.

## 3.2. Research Design

The proposed research design adopts Crotty's (1998) framework. The four elements (Figure 8) are arranged as a framework to explain the research design process of this study: epistemology, theoretical perspective, methodology, and methods.

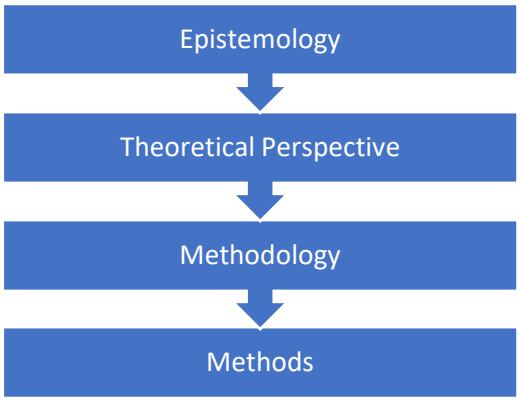


***Figure 8 The four elements of a research process***

*Source (Crotty, 1998, p.4)*

## 3.3 Epistemology and Theoretical Perspective

According to Crotty (1998), epistemologies are theories of knowledge that shape one's theoretical viewpoint and understanding of how one comes to know what they know. In order to obtain participants' points of view, this research employs a constructionist perspective on knowledge. There is no objective truth in constructionism, and this aligns

with how the definition of quality project management in this study will be created rather than discovered. As truth is dependent on our consciousness to be constructed as a result of the realities present in the world, interpretivism is linked to the epistemological view of constructionism (Crotty, 1998). While acknowledging that reality and knowledge are not objective but rather shaped by individuals within an environment as participants in the social world, interpretivists are not interested in the details (O'Reilly, 2009). Interpretivism is characterised as a depiction of different meanings discovered by various people, and it is subjective. Similarly, the fact that project managers deal with a variety of realities, viewpoints, and realities warrants using interpretivism as a theoretical perspective in the research study – where the researcher will interpret the data acquired from people's subjective experiences. The section that follows will demonstrate the philosophical stance that informed the study's methodology and methods.

## 3.4 Methodology and Methods

The epistemological stance (Constructionism) and theoretical perspective (Interpretivism) adopted informed the choice of qualitative methodology as this process fit best to answer the research question of this study - to provide insights and understanding of people's experiences (Denny & Weckesser, 2019). The qualitative approach refers to how people interpret their surroundings, what it means to them to be in a certain circumstance, and how they would react to it (Willig, 2008). It focuses on processes grounded in the nature of reality socially constructed between the participants and the researcher (Denzin & Lincoln, 2011). It allows a better understanding of the realities of the social experiences of project managers who have experience in high-rise building projects in Malta. The method employed is face-to-face semi-structured interviews with six project managers with experience in Malta's high-rise buildings. Semi-structured interviews are described by Longhurst (2003) as interviews between the interviewer and interviewee that develops into a dialogue; the interviewer uses questions to try and elicit information. This method encourages two-way communication, allows for in-depth information, captures rich insights into the participants' lived experiences, and unmasks their points of view (Turner, 2010). The choice of semi-structured interviews permeates the discussion to flow and provide flexibility with questioning. In an interview, open-ended questions allow for the

possibility of unexpected responses, which may lead to the researcher learning the information they had not previously considered (Cohen, Manion, & Morrison, 2007). The participant sample does not need to be huge to obtain in-depth information using qualitative data (Queirós, Faria, & Almeida, 2017).

## 3.5 Participants and Sampling

Six individuals were chosen for this study using convenience sampling. According to various factors, such as accessibility, availability, and desire to engage in the study, individuals are chosen through convenience sampling – falling under the category of nonprobability and nonrandom sampling (Etikan, Musa, & Alkassim, 2016). In convenience sampling, potential volunteers who are readily available to the researcher are also taken into account. Indeed, to recruit a limited number of project managers who have experience in high-rise buildings in Malta, the six individuals were approached personally. The participants were individuals responsible for the project management of high-rise buildings in Malta in the past two decades. All participants had experience in building, services, and finishes in the private sector when working on these large-scale projects.

The six participants in this study ranged in age, years of experience as project managers, nationality, and qualifications acquired, yet they all had one criterion in common – experience in high-rise building projects (Table 2). In order to safeguard the privacy of the participants, who were limited in number due to the scarcity of project managers in Malta with expertise in high-rise constructions, their names were changed and pseudonyms (P1-P6) were employed. Additionally, Table 2, which presents the participants' characteristics, does not disclose individual-specific details.

| Project Managers' Characteristics: P1 – P6 (Gender: Male) | |
|---|---|
| Age | Ages ranged between 43 and 65 years. |
| Nationality | The different nationalities were Maltese and English. |
| Years of experience as a project manager | Experience ranged from 22 to 30 years of experience. |
| Qualifications | Qualifications ranged between Diploma and Master's degrees. |

***Table 2 A range of characteristics among the six project managers who have experience in high-rise construction in Malta***

The participants were provided with an informational letter with a concise overview of the dissertation and its stated aims. Upon accepting the invitation to participate, the participants were subsequently provided with a consent form. The participants were reminded of the guarantee of anonymity throughout the study, and were informed that the audio recordings would be securely disposed of after a period of one year following the completion of the dissertation.

## 3.6 Data Collection

A pilot semi-structured interview was tested with two project managers who were not participants in this study. The results of the pilot interview were considered, and necessary amendments were made to the set of questions posted to the participants. The final set of questions comprised thirty-seven open-ended questions (Appendix A) that sought to explore the experiences and viewpoints of the chosen six project managers. The number of questions may have easily exceeded thirty-seven; however, these were developed and framed to a set of thirty-seven after a thorough critical assessment of the literature pertaining to the concepts and theories supporting the issue. The interview questions were associated with the following key concepts emanating from the literature review to answer the research questions of this study:

- *Defining project quality management*
- *Planning, context of organisation, leadership*
- *Implementation, support and operation*
- *Check, performance evaluation*
- *Challenges and Improvement*
- *Role, skills, tools and techniques of the project manager*
- *Opinion* and new challenges of the project manager

Data was collected through one-on-one forty-five-minute interviews. Most participants preferred to receive the interview questions prior to the interview. All interviews were recorded and translated to enable verbatim text transcription for the analysis process.

## 3.7 Analysis

The systematic data analysis used deductive and inductive methods (Azungah, 2018; Braun & Clark, 2006) to provide the best answer possible to the research question of this study. The preparation, organisation, and data analysis process is visually presented in Figure 9 below and systematically presented in this section:

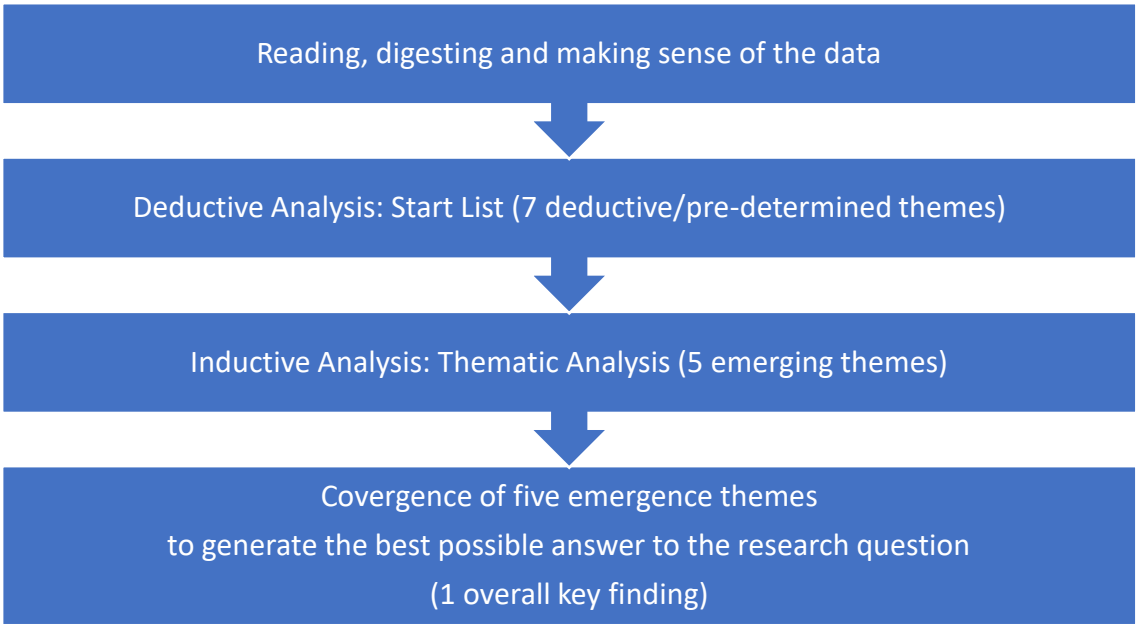


***Figure 9 Preparation, organisation, and data analysis process***

*Source (Anungah, 2018; Braun & Clark, 2006)*

In order to make sense of the entire collection of data and comprehend "what is going on" (Morse, 1999, p. 404) through reflexivity, open-mindedness, and adhering to the logic of participants' narratives, I first immersed myself in the data, absorbing and digesting it. This was followed by adopting a deductive technique using the interview questions as a lens to help generate a list of pre-determined themes on the subject of inquiry or what is known about the phenomenon of inquiry (Bradley et al., 2007; Thomas, 2006). As shown in Table 3, a start list (Miles & Huberman, 1994) of *a priori* categories was created using the interview questions (most of which were sequentially structured on the PDCA Approach and existing literature) to outline the seven deductive/pre-determined themes driven by key concepts related to the topic of inquiry:

| Interview Questions | Seven Deductive themes |
|---|---|
| Questions 1-4 | 1. Defining project quality management in high-rise construction |
| Questions 5-9 | 2. Quality management planning and its measures within high-rise projects |
| Questions 10-13 | 3. The processes and practices implemented to achieve quality goals through QA and QC measures in high-rise projects |
| Questions 14-18 | 4. Performance evaluation |
| Questions 19-23 | 5. Challenges and improvements contributing to or mitigating reworks within high-rise projects |
| Questions 24-30 | 6. The project manager’s roles and skills |
| Questions 31-37 | 7. New challenges and opinions |

***Table 3 A start list (Miles & Huberman, 1994) of a priori categories generated seven deductive themes***

The seven deductive/pre-determined themes gave initial focus to the process of finding certain significant data features that directly connect to the interview questions and the key concepts related to the literature review, research objectives, and research question.

An inductive analysis was then carried out using Thematic Analysis (TA) to identify emerging themes from the seven deductive/pre-determined themes. According to Braun and Clarke (2006), TA, which looks for themes or patterns within the data, is a practical and theoretically open method for analysing and identifying qualitative data. A TA framework was first introduced by Braun and Clarke (2006) and involves a six-phase analytical process (Table 4):

| |
|---|
| Step 1: Familiarise with the data |
| Step 2: Generate initial codes |
| Step 3: Search for themes |
| Step 4: Review themes |
| Step 5: Define themes |
| Step 6: Write-up |

***Table 4 Thematic Analysis – Six-phase analytical process***

*Source (Braun & Clarke 2006)*

In this study, steps two through five in Table 4 involved using manual coding to identify patterns and generate codes within the seven deductive/pre-determined themes. This initial coding process facilitated the systematic exploration, evaluation, and categorisation of themes, identifying five distinct emergent themes (Table 5). To achieve a comprehensive knowledge of the implications and provide a comprehensive analysis of the overall findings, it was imperative to expand the scope and investigate the convergence of the five emerging themes (analysing the recurring patterns using TA) towards a single overarching major finding, thereby offering the best possible answer to the research question (Table 5).

| Seven deductive/pre-determined themes | Five emerging themes | Overall key finding |
|---|---|---|
| 1. Defining project management in high-rise construction | 1. Critical factors for successful project quality management in high-rise construction | Ten success factors, a culture of quality, workforce professionalisation, and project managers who communicate for coordination can improve the quality management of high-rise construction projects in Malta |
| 2. Quality management planning and its measures within high-rise projects | 2. Client's approach to the planning process is the key influencer to quality management | |
| 3. The processes and practices implemented to achieve quality goals through QA and QC measures in high-rise projects | 3. Barriers call for quality process, assurance, and control on the part of the individual | |
| 4. Performance evaluation | 4. Quality management challenges that increase reworks in high-rise building projects shed more light on the people level | |
| 5. Challenges and improvements contributing to or mitigating reworks within high-rise projects | | |
| 6. New challenges and opinions | | |
| 7. The project manager's roles and skills | 5. Communicating for coordination enables project managers improve quality | |

***Table 5 Five themes emerged from seven deductive/pre-determined themes, and their convergence led to one major finding.***

The principle of reflexivity was considered throughout the analysis procedure since Ritchie & Lewis (2003) believe it to be a key component in guaranteeing objectivity and impartiality when evaluating qualitative data. Reflexivity is the recognition of one's beliefs and assumptions, how they affect their research, and how the research itself may alter the researchers (Ramani et al., 2018). It is crucial to avoid bias because most research is based

on the researcher's personal viewpoint. The researcher must maintain objectivity, and the data must not be skewed for the research to be as accurate as possible (Malterud, 2001).

## 3.8 Ethical Considerations

Ethical concerns are included in all social studies. The fact that interviews include human interaction, may be intimate, and yield personal information gives them an ethical component (Cohen, Manion, & Morrison, 2007). Prior to collecting any data, the Research Ethics Committee of the University of Malta initially secured ethical approval. Informed permission, confidentiality, and the interview's outcomes are the key ethical considerations that Cohen, Manion, and Morrison (2018) listed when conducting interviews:

- **Informed permission**

After they agreed to participate, a consent form was sent. In this form, I made it clear that participants had the liberty to decline to answer any specific questions and the freedom to leave the study if they felt the need. Respect was shown for their voluntary participation. I conducted the interview in a setting where they were at ease and where they had the freedom to express themselves out of even greater respect for them. Making a participant feel comfortable is crucial since it encourages them to talk about a subject in greater detail and makes them less hesitant to express their thoughts because an interview is a social event as well as a method of gathering data (Cohen, Manion, & Morrison, 2007).

- **Confidentiality**

I made it clear to the participants in the information letter and consent form that their confidentiality, anonymity, and non-identifiability would be assured throughout the whole process of this research study (Cohen, Manion & Morrison, 2007). In addition, I told the interviewees that a password would be used to restrict access to the information to me as the researcher. All participants' personal information was kept private and confidential.

- **Interview's outcomes**

All participants were notified that they would receive a copy of the completed dissertation. Ethical considerations must not be disregarded. It is imperative for the researcher to possess a comprehensive understanding of the ethical principles at play and to be cognisant of the various ethical concerns that arise in the realm of social research (Bryman, 2016).

## 3.9 Chapter Summary

This chapter was crucial to understanding the synergy between this dissertation's major aspects. It demonstrated how pre-research assumptions linked to numerous theoretical perspectives constituted the conceptual underpinnings, guided research design, analysis procedure, and fieldwork. I present the study's data and analyse it in the following chapters. To strengthen the research's theoretical foundation, the merged findings' conclusions are aligned with this study's conceptual framework.

# Chapter 4: Results, Analysis and Discussion

# Chapter 4: Results, Analysis and Discussion

## 4.1 Chapter Introduction

Based on the adoption of systematic data analysis utilising deductive and inductive methodologies, as described in Chapter 3 (Figure 9), this chapter will offer the data findings, analysis and discussion through the structure of five distinct themes. These five core themes emerged (inductive analysis) from patterns identified in seven pre-determined themes (deductive analysis) and were subsequently converged to facilitate comprehension of the data, resulting in a singular overarching discovery, as illustrated in Figure 10. This discovery effectively addresses the research question posed in this investigation - *What can we learn about project quality management from the perspectives of project managers in high-rise buildings in Malta?*

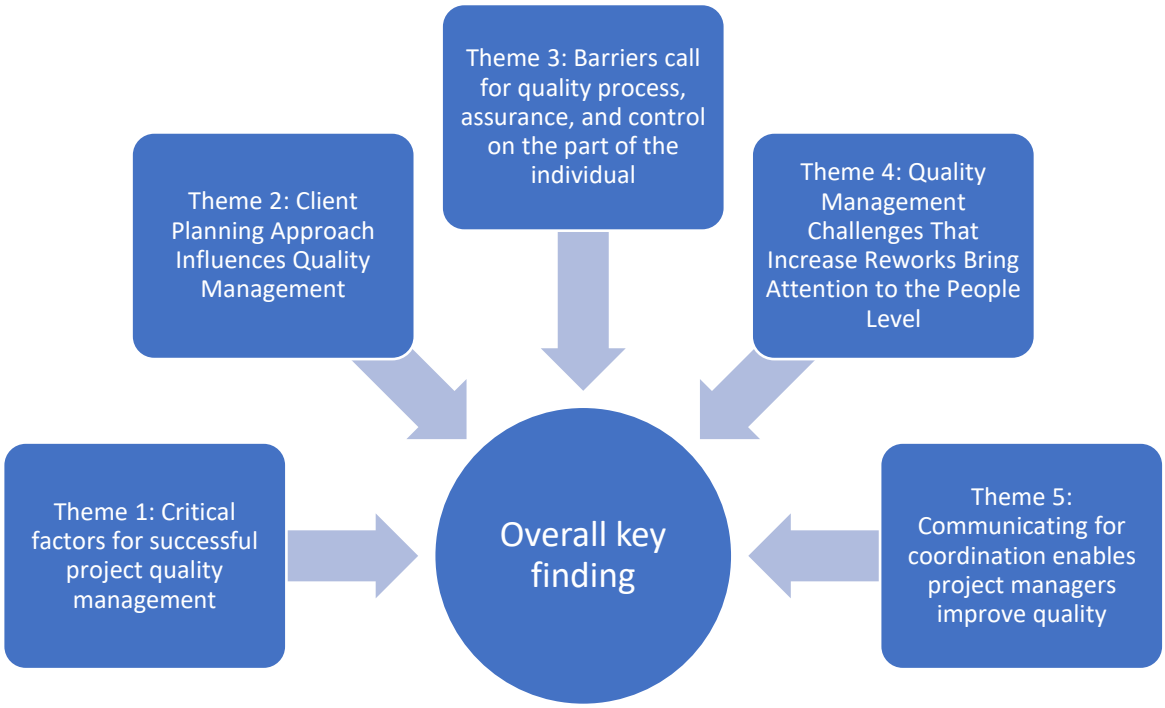


***Figure 10 The approach that best tells the story of this study's findings: Five distinct themes come together to answer the research question***

The present chapter establishes a connection between the results derived from six interviews conducted with the study participants and the pertinent literature. This linkage is intended to guide the ensuing discussion and facilitate the development of fresh insights into the subject matter of this study, namely project quality management in high-rise buildings. The decision to present the analysis, findings, and discussion chapter in this manner is based on the argument put forward by Robson and MacCartan (2016) regarding the conduct of investigations. They suggest that one should opt for the approach that most effectively communicates the story being presented. The subsequent sections present the five emerging themes and the overall important finding of this study. These key findings illustrate the significant contribution that this study has made to the existing knowledge in the field.

## 4.2 Theme 1: Critical Factors for Successful Project Quality Management

Participants were asked to define project quality management in high-rise buildings compared to low-rise, why it is critical, how it can be gauged and at what stage they were involved as project managers working on large-scale projects. The participants provided several responses that can be summarised in ten critical factors they think should be taken into consideration for successful project management in high-rise projects, making a case for more awareness, reflection and action from the people's side to enhance quality in project management.

### 4.2.1 Logistical complexity and elevated risk due to structural concerns

P4, a project manager in high-rise construction, stated that,

> *"… project quality management should always be there, and it should be treated very seriously in all that is being done and in a high-rise, you cannot afford the risk of not managing it". (P4)*

This statement was also reflected in the responses of all participants on effective project quality management in high-rise buildings. They highlighted the need to adapt quality

management strategies to the unique characteristics of each high-rise building project. P2 and P6 emphasised the increased logistical complexity in high-rise construction. In this light, P5 and P6 pointed out that factors like vertical logistics and repetitive construction activities influence high-rise buildings' quality management. They stressed that quality management becomes critical due to the need for precise organisation of logistics, which is more challenging in high-rise projects compared to low-rise ones. Similarly, Riad (2016) contends that the quality of high-rise buildings is influenced by various aspects, one of which is vertical transportation.

Another point raised by the participants was the limitations of the surroundings and construction methodology in high-rises, which make planning and people management more critical compared to low-rise. P6 calls for more detailed quality management in high-rise projects due to the complications and challenges of correcting deficiencies on such large-scale projects. P3 noted that high-rise construction is often more delicate, with a desire to complete the work quickly due to the scale of the project and complexity. This urgency can lead to potential quality issues, and quality management becomes critical to address structural concerns and health and safety issues. P1 and P4 prioritise the importance of quality management in high-rise buildings, given the elevated risk linked to structural concerns. P6 added that it encompasses various aspects beyond construction, such as materials quality, site management, health and safety management, and performance precision. Yan (2019) stated that qualified materials guarantee project quality in high-rise structures. Thus, the materials department should develop the project material procurement strategy per the construction plans and drawings to achieve contract quality. Further, recent research in high-rise construction emphasises that physical characteristics, organisational aspects, design concerns, quality considerations, safety protection, work environment, and health and safety should be included (Raamkumar & Indhu, 2022).

### 4.2.2. Stakeholders to recognise the value of quality standards and sustainability

Another argument linked to mitigating risks for project quality management in high-rise buildings was that developers and stakeholders did not always recognise the need to use quality standards. P6, P4 and P2 explained how developers they worked with perceive

higher risks in high-rise construction, leading them to prioritise quality management using quantity surveying, quality surveying, document control, and considering environmental considerations. P6 and P2 stressed the importance of measuring and ensuring quality at every stage of construction, emphasising the significance of LEED certification and benchmarking. P5 mentioned the significance of continuous sampling and reinforcement checks in high-rise construction. Likewise, literature shows that a primary benefit of implementing standards such as ISO is the enhancement of customer satisfaction (Abdel-Razek, 1998). P2, P4 and P6 stated that a holistic approach to quality management, including quality standards, appears more extensive in high-rise projects than in low-rise ones. All participants highlighted the necessity of ongoing monitoring and quality standards to mitigate risks and maintain quality levels throughout construction, yet not all experienced it in practice. One of the participants, P6, emphasised sustainability as a top priority in project quality management, specifically focusing on Environmental, Social, and Corporate Governance (ESG).

### 4.2.3 Scale and complexity of project, quality management investment, and client expectations

P4 referred to tailoring the quality management set-up to the scale and complexity of the high-rise building project:

> *"… if we are talking about a small project, it might be the case that all you would need is for the architect's supervision to reach the aim of the quality management, quality assurance and quality control but it might be the case that as the project becomes more complicated, you might need a whole set up, that is, quality manager, people on site that are dedicated to this…" (P4)*

This statement raises the question: Are developers willing to invest in higher quality teams and management for high-rise projects to mitigate errors leading to spiralling costs? When discussing quality management, P5 argued that:

> *"Quality management may be affected due to budgetary issues and the lack of resources, the tradesmen employed, and the products used are all aspects of quality management that need to be observed to ensure a good quality level." (P5)*

Poor quality can have more serious consequences in high-rise structures, affecting the immediate area and all the floors above it (Baffoe-Twum, 2019). The cost per square meter for high-rise construction is significantly higher, making any errors or quality deficiencies much more expensive to rectify, as further described by P5 . A similar argument was raised by P6. The majority of participants emphasised the significance of meeting client expectations in defining project quality management, as outlined in the TQM philosophy. In this light, literature shows that expectations in high-rise projects are stricter due to visual and financial factors (San Santoso et al., 2003).

### 4.2.4 Prioritising pre-execution and recruiting competent consultants and foreign experts

The majority of participants stressed that, given their current knowledge and improved experience, it is essential for the quality management team to prioritise the pre-execution phase by investing more resources and effort into it, rather than primarily focusing on post-execution activities. P4 states that:

> *"… if I had to redo it I would put more effort in stages 1 to 4 and make sure that the team is more coordinated so that from the procurement onwards, you will be more water-tight and avoid the problems." (P4)*

Similarly, over two decades ago, Baccarini (1999) argued that a project has reached its quality expectations when it successfully fulfils all the conditions agreed upon before its initiation. P4 also highlighted that in the consultancy stage, the consultants who are engaged for a project of a certain scale should be in for it only if they are competent enough, able to do the drawings efficiently, without over design and in a timely manner and that they specify in the best way possible. P6, P4, P2 and P1 mentioned that foreign expertise may be required to fill this knowledge gap in management and trades. P6 stressed the value of gaining knowledge from global experiences, particularly in nations with a long history of building high-rises, such as the UK, Germany, and France. P6 strongly advocated for Malta to adopt international best practises and regulations in order to prevent the recurrence of problems encountered by other countries.

### 4.2.5 Early project manager involvement

The six participants noted that project managers' involvement and stage matter. P1, P4 and P6 stressed that the project manager needs to be involved from the start in high-rise projects. P1 stated that,

> *"… the project manager needs to be brought in from the beginning because the architect needs control, and all the other consultants need control. It makes a huge difference, because they all ought to be put together." (P1)*

Half of the participants added that the level of the project manager's involvement also depends on the individual's role and responsibility in the high-rise project, with some individuals having a broader scope of engagement, while others specialise in the initial planning and preparation stages or during the implementation stage. In this study, five of the project managers involved in high-rise construction projects were involved from inception to completion. P4 was the sole individual who did not participate from the project's inception; nonetheless, he was involved during the pre-construction phase. This finding is in line with a recent study conducted by Pavia (2021), where it was observed that project managers in Malta tend to be primarily engaged in large-scale projects during the planning stage, at the initial phase.

Theme 1 captures how six project managers in Malta perceive project quality management in high-rise construction, why it is critical, how it can be gauged, and their level of involvement. Findings from their diverse experiences in high-rise projects surface ten critical factors they see as essential to successful project quality management:

| |
|---|
| 1. Precise organisation of logistics, particularly in vertical logistics |
| 2. A feasible project timeline taking into account the scale of the project and complexity issues |
| 3. Address elevated risk due to structural concerns |
| 4. Stakeholders to recognise the value of quality standards and sustainability |
| 5. Invest in quality management through a whole set-up to mitigate costs |
| 6. Meeting client's expectations |
| 7. Quality management team to prioritise the pre-execution phase |
| 8. Consultants in large-scale projects should be competent |
| 9. The project manager to be involved from the start |
| 10. The need for foreign expertise |

These ten emerging factors further strengthen previous theories, policies and practices (Deming, 1986; Masaaki, 1986) advocating for taking project quality management seriously, especially in high-rise buildings (Alwi et al., 1999; Fegade & Bhangale, 2016; Fromsa et al. 2020), and throw light on a need for more awareness, reflection, and action from the people involved. The factors may also serve as a roadmap to guide individual and collective efforts toward more effective project quality management in the Maltese evolving high-rise building scenario and beyond. The next theme will delve into another key finding emerging from what the participants had to say about the planning process of project quality management in high-rise buildings in Malta.

## 4.3 Theme 2: Client Planning Approach Influences Quality Management

Theme 2 entails a thorough examination of the influence on the quality process in high-rise constructions in Malta, specifically during the phase of planning. The participants expressed their perspectives on how they view the preferences of clients while making decisions regarding cost, time, or quality during the early planning phase

### 4.3.1 The client's mindset and priorities for cost, timing, and quality during initial planning

An interesting finding was that half of the participants (P1,3 and 6) declared that cost is the primary driver for many developers, P2 experienced one client who prioritised quality and timeliness, and P4 and 5 referred to clients who opted for a balanced approach of quality and cost over time. In sum, the participants' responses located three ways clients approach the planning process by choosing different factors as a priority:

1. Client's cost-driven priority
2. Client's quality and time priority
3. Client's cost and quality over time priority

This section will further explore these three client priorities when choosing cost, time or quality during initial planning in high-rise building projects in Malta.

P1 explained that clients may opt for cheaper products and solutions, even if it compromises the overall quality of the project. Similarly, P1 and P3 shed light on the prevalence of cost-driven clients prioritising fiscal considerations above all else. These clients may opt for cost-effective products and solutions, potentially compromising the overall quality and longevity of the project. This cost-centric approach can lead to a "false economy" (P1) in the long run, where future repair or maintenance costs offset initial savings. Participant P3 added that cost is the primary driver for many developers, followed by time constraints and the materials' quality. This perspective aligns with the common industry constraint of adhering to strict project budgets, where minimising costs often takes precedence in decision-making processes (Ojala, 2009; Taylor, 2008). In contrast, participant P2 offers insights into clients prioritising quality and timeliness. The diverse array of client priorities in high-rise building projects encompasses a range of considerations, from cost-driven decision-making to an emphasis on quality and time. Achieving the desired quality within budgetary and scheduling constraints is a complex challenge. Participants 4, 5 and 6 experienced a more balanced approach, suggesting that

many clients seek equilibrium among cost, time, and quality considerations. They highlighted that:

(i) while the cost remains a significant driver, there is a recognition of the need to address cost considerations during the tendering stage and throughout the project's lifecycle; and

(ii) time constraints are an ongoing challenge, underscoring the delicate juggling act that project managers and stakeholders must perform to satisfy these diverse demands.

Balancing these priorities and achieving the desired quality within budget and schedule constraints can be challenging to ensure quality measures during the initial planning stage. This nuanced understanding of client priorities underscores the complexity of successfully managing and executing high-rise projects. It depends on the type of clients but certainly most clients will be constrained by costs. If a developer understands the quality of that, then it will be easier to ensure that all of them will have the same footing. In this light, P6, raised the case of how the developer's understanding of quality influences decision-making in the planning stage of a project, thus impacting the level of quality management planning:

> *"Quality is very technical, so unless developers have a quality mindset, they will talk about quality but will not necessarily understand what that means" (P6)*

So, if an individual's mindset about quality planning influences the client's choice of time, cost and quality in the initial planning stage of high-rise projects, how do project briefs feature?

### 4.3.2 How the project brief and client choice affect quality management planning and measures

All participants recognised the importance of having a project brief for high-rise projects. They agreed that a well-defined project brief is a foundational document that guides the entire project during the planning stages. There can be problems later in the project's lifecycle without a thorough brief (Othman et al., 2004). The study's findings identified

three approaches adopted by clients in the planning process, wherein different aspects were prioritised. This led to the identification of three distinct types of briefs and the development of multiple routes for quality management planning, set-up planning and using standards in the planning process of high-rise projects in Malta (Figure 11).


***Figure 11 How client's priorities influence quality management planning and its measures in Maltese high-rise projects***

P3 claimed that there was no brief before the project was commenced. P3 argued about the absence of a design brief at the beginning of their project, which led to an initial lack of clarity and understanding of the complexities of high-rise buildings. Conversely, P1, P2 and P6 did experience the use of a project brief and stakeholders giving importance to its quality in Maltese high-rise projects. P2 emphasised how the brief was crucial for identifying the prime use and infrastructure needed for the selected location:

> *"… we did have a project brief; the initial steps begin with determining the primary use and selecting the location. The location significantly influences the compatibility of the intended use." (P2)*

P2 also pointed out the importance of a well-coordinated team of project managers, architects, engineers, and a supportive client when implementing a brief. P1 and P2 highlighted the critical role of both the client and the architect in developing the project brief. Similarly, Kelly et al. (2003) claimed that effective collaboration among team members, especially in the early stages, is crucial for project efficiency and clarity of objectives. P1 and P2 also conveyed the message that the client's vision and requirements are essential. P2 argued that not everyone can envision a project or their desired outcome. P6's knowledge and experience with implementing the brief led him to insist on a detailed project brief when he was involved in a high-rise building project. He emphasised that the more detailed, focused, and measurable the brief is, the better it is for project execution and risk management. A detailed brief helps minimise the risk of failures, errors, and budget overruns (Othman et al., 2004). P4 and P5 discussed how they experienced the implementation of a brief that evolved over time. P4 explained that the design development took place, accompanied by ongoing changes to the project brief. He indicated the focus may initially be on design aspects, but as the project advances, attention shifts to structural considerations, material quality, and other intricacies. The evidence above reveals a chain reaction between the client's choice of cost, quality and time and how the brief features in the quality management planning process.

The findings derived from the participants' responses provide more evidence that the choice made by the client has a significant influence on the strategic planning process for quality in high-rise construction projects, as well as the subsequent implementation of relevant measures. P1 emphasised a sequential approach involving the development and approval process and rigorous quality control measures. P2 primarily emphasised on quality through measures such as improving logistics and assigning specialised team leaders for each trade, all operating under the guidance and coordination of a project manager. He also stressed the importance of starting from a well-structured programme of works as a pivotal approach to comprehensive quality planning:

> *"The planning, the deliverable of the lifecycle, I always start from a good programme of works, and from there I start moving out." (P2)*

P4 noted that there is recognition of instances where quality management planning commenced relatively late in the project, so he suggested that:

> *"….the ideal scenario when planning for quality management is to start and have quality assurance on the plans, the design process, the design management, and procurement because all this was missed." (P4)*

The timing of quality planning varies, with some participants (P6 and P2) recognising the importance of initiating it at earlier stages to ensure comprehensive coverage. From P6's experience, the ideal scenario is a detailed planning process involving pre-construction meetings with clear agendas after a brief is developed. He also referred to the significance of meetings that aim to fully comprehend project details, identify potential shortcomings, coordinate various aspects, and explore value engineering opportunities to ensure that the project's delivery fits the timeframes and costs. Regarding the latter, P2 added:

> *"I would rather spend six more months planning because that will definitely save you a lot of time and money. The more you can plan before, the less you spend on the construction phase". (P2)*

Additionally, participants shared the diverse approaches experienced related to the implementation of measures in quality management planning. P6 consistently emphasised the integration of BIM technology, which underscores its integral role in modern quality planning efforts to measure. According to Nguyen et al. (2018), BIM technology is regarded as a valuable tool for the purposes of planning and management. P1 stressed that:

> *"You need to be able to trace what has happened; if there is no traceability, it is a nightmare." (P1)*

The emphasis on traceability and coordination is common throughout the responses of this study, highlighting the need for meticulous planning and management in high-rise construction projects. P1 and P4 discussed how they implemented customised QA and QC plans tailored to each project's unique needs, which proved highly satisfactory. They explained that these plans break projects into stages, each with method statements and a corresponding QA and QC strategy. P4 reported that the set-up plans used during

execution enhanced quality control. P2 embedded quality measures within contracts, specifications, and conditions and thus insisted that this is crucial. He added that clear guidance should be provided through detailed contracts, bills of quantities, and preambles and contracts to include QA and QC documents, checklists, and independent quality checks. On the other hand, P3 noted that quality audit plans during the initial stages of implementation were minimal. In this setting, quality management relied on tender documents and finishing contractor contracts. This ensured that quality standards met contractual requirements. P6 experienced coordination that aligned various specialities and identified areas requiring improved coordination efforts for quality measures. PDCA helps standardise processes and procedures, reducing variations and increasing consistency, which is crucial for quality management (Abuazza et al., 2020). This is in line with the study of Childs-Johnson (2012), which states that increased standards of quality characterise the field of high-rise building engineering.

The six participants experienced the customisation of standards in the planning phase in various forms. P3 was not involved in the quality standards and requirements process during planning stage and explained that the architect was responsible for selecting and identifying the standards and quality requirements. In this light, Abas et al. (2015) assert that due to ineffective or nonexistent quality standards, significant amounts of time, money, and resources are squandered annually. P6 and P2 discussed the alignment of project planning with international sustainability standards like Leadership in Energy and Environmental Design (LEED) and Building Research Establishment Environmental Assessment Method (BREEAM). This findings underscores the growing focus on sustainability in high-rise construction, encompassing materials reuse, recyclability, and occupant well-being (Bauer et al., 2009; Iwaro & Mwashan, 2012; Lotfabi, 2014; Zhai et al., 2014). P4 stated that the requirements for building services and fire, a combination of British Standards (BSs) and other international codes, served as the baseline for quality plans for one to assess whether these requirements were met. Previous literature shows that the use of international standards such as ISO 9001 offer a structured approach to establishing and implementing a quality management system (QMS) (Rybski et al., 2017). Findings from this study also reveal that during the planning phase, some customers do not

value the money it costs to meet the expected standards. P2 explained that investors in Malta want to get money back as quickly as possible to cap funding:

> *"… standards, will be included in the specifications, but really and truly, the Maltese culture is weak, whether it is high-rise or not".*

This statement serves as an eye-opener on the influence of diverse cultures on implementing quality measures for project quality management. This is an aspect that cannot be overlooked for quality project planning.

Theme 2 elucidates the significant impact of the client's decision-making process on various aspects of the project, including the formulation of the project brief, the approach adopted for project quality planning, and the implementation of measures pertaining to high-rise building projects. The participant's accounts revealed several significant concerns, including the client's emphasis on cost during the initial planning phase, the inadequate or substandard briefing for planning purposes, the standards of quality, and the impact of the client's mindset and culture on quality management planning and evaluation. The next theme will track down the applied practices and processes to achieve quality goals and meet the required standards for high-rise projects.

## 4.4 Theme 3: Barriers Call for Quality Process, Assurance, and Control on the Part of the Individual

The third theme looks at the procedures and practices that the six project managers used and how these affected QA and QC procedures in high-rise projects in Malta. P6 and P4 emphasise the importance of quality control and oversight in a construction project and the significance of having a structured approach to quality control. P4 emphasises the need for ongoing reviews of incoming information, while P6 stresses the importance of predefined quality standards. By combining these perspectives, it can be argued that a robust quality control system should include initial checks, continuous monitoring and adherence to established standards throughout the project's lifecycle. P1 experienced how

quality goals could be achieved by QA, QC planning and procedures by thinking about mock-ups to check for implications with other trades of work, approval of materials and ensuring that procedure changes will be documented for future reference. Chung (2002) highlighted that QA involves auditing quality requirements and QC measurements to apply the right standards and practical definitions, facilitating continuous improvement in project quality management procedures. This evidence aligns with a previous study by (Arditi & Gunaydin, 1997; Rumane, 2017; Salvi 2020), which states that companies may guarantee that their goods or services meet the required standard of quality by putting both QA and QC procedures in place. This study further reveals that fixed mindsets and a lack of quality teamwork and expertise may categorise a high-rise project's process phase to lower quality levels.

### 4.4.1 The low-rise mentality of the client and employee within high-rise projects

P6 stated that in the Maltese built environment, the employee's mindset is primarily framed within low-rise projects, and how this is generating a lack of quality in the process, levels of collaboration and meeting standards:

> *"… low-rise mentality applied to high-rise construction can lead to quality and timeline issues and strained contractor relationships." (P3)*

This statement aligns with previous work highlighting the critical aspect of a growth mindset for success and quality by Liao et al. (2023) and implies the need for proactiveness and tackling problems from the roots of the cause. In this light, P3 explicitly stated that adherence to standards is effective at the administrative level, however, he observed that workers at the project workforce level tend to resist working in accordance with established standards, characterising it as an ongoing "struggle". P1 stressed that quality control procedures are the aftermath of the client's choice, mindset, influence and control on all project phases. The identified focus on the mindset of the client in QA and QC procedures in this study is incongruent with research outcomes of Ashokkumar (2014). The research suggests that clients often possess a substantial financial stake in high-rise

projects and, as a result, exhibit a greater inclination towards implementing rigorous quality control measures to protect their investment.

### 4.4.2 Low levels of communication, collaboration and teamwork

Three participants (P2,P3, and P5) raised the case on the vital role of efficient communication among project stakeholders, such as contractors, consultants, and project management teams, in ensuring effective quality control. P1 notes the importance of ensuring that all project stakeholders are well-informed about the anticipated quality standards, indicating the adoption of a standardised methodology. P6 mentioned effective communication through the use of blockchain systems. He explained how it guarantees the integrity of the quality control system since it is simultaneously stored in multiple locations. This evidence supports literature claiming that without effective communication, process quality and quality assurance and control cannot be sustained to achieve the set goals (Zelnik et al., 2012).

Participants (P1, P4, and P6) emphasised the importance of collaboration, teamwork and dedication of quality management teams for successful implementation to meet the required quality standards. P3 added,

> *"… it would help if you had a team, and a team at the end of the day is money. Is there room for a team whilst maintaining profits? That is where quality control is. You are present at every step along the way, but you cannot be alone."(P3)*

All participants stated that the project manager, should be part of the managing team, communicating with other stakeholders and fostering collaboration. Both P4 and P6 shared their experience of the presence of a dedicated quality management team led by a quality manager. P4 explained that this team creates quality plans, checklists, and regular quality reporting. P1 suggested that best practices or processes such as QA and QC "should be carried out directly on-site through collaboration with all parties involved because it comes down to the people and is a team effort." P2 explained that successful quality management in high-rise buildings is achieved when timeframes and budgets are reached through

quality management team effort without the need for reworks or defects due to wrong planning or scope changes. This is in line with the work of Love et al. (1999) and Atkinson (1998). P6 also highlighted the importance of an inspection test plan (ITP) procedure, which helps to improve quality assurance at each phase of the project and to mitigate quality risks at projects.

In contrast, P3 presents a contrasting perspective where the responsibilities were not assigned to a quality management team. The responsibility for ensuring quality assurance and implementing quality measures lies with the contractors assigned to deliver the final product according to the specifications in the contract. This approach transfers risks, including reworks and defects, to the contractor, encouraging them to maintain cost control. P3 provided additional clarification that following the completion of works, "construction works were being checked and verified by the architect, and the engineer checked M&E's works." There was an absence of a quality management team to fulfil this task.

The evidence presented in this section underscores the importance of robust communication, effective collaboration, and high-quality teamwork in the context of quality assurance (QA) and quality control (QC) processes within high-rise construction projects in Malta.

### 4.4.3 Inconsistent adherence to standards

P1 experienced the application of non-conformance reports (NCRs) and similar precautions from the very start of the project. He added that if there is a problem, samples must be checked for verifications before further work is resumed. P4 explained that quality standards are met during QA and QC processes when they have all the various facets of quality, including effective communication that starts from the client to the last of the workers involved. He added that the contractor needs to plan the agreed upon and implemented QC during the on-site process. P2 and P4 stated that the quality team should audit the project weekly, fortnightly, and monthly, starting from management down to the actual materials being employed on-site. Ren et al. (2015) assert that the PDCA

methodology facilitates the development of a culture centred on continuous improvement by prompting organisations to regularly assess and refine their processes. Consequently, this iterative approach results in sustained advancements in both the efficiency and effectiveness of the organisation.

### 4.4.4 Lack of involvement of quality team management experts (third parties)

P6 discussed the importance of engaging higher-order organisations (involvement of third parties) with experience in risk management for high-rise projects to improve the quality of QA and QC processes. P4 and P5 insisted that these third parties are engaged in the all the phases, including QA and QC processes, to identify and manage risks effectively. For example, a scheduler to monitor timelines, quality controllers on site to check whether materials are according to specifications, architects to issue specifications, workers to adhere to plans and specifications and to adhere to site regulations and health and safety requirements to contribute to success.

### 4.4.5 Resistance to Documentation

Project documentation includes quality and quality control measurements from previous projects and is used to evaluate the project's processes and deliverables (Dement'eva et al., 2018). P4 shared his experience with a proper documentation system regarding decisions taken, site instructions, and changes for handing over the building. He indicated that documentation is viewed as a challenge, and, in Malta, “you encounter a lot of resistance from consultants and, in general, all the contractors”. P4 concluded that a lack of resources and resistance to change are the major issues for quality management in Malta. This data supports the findings of a research study by Bubshait and Al-Atiq (1999), where many contractors lack proper documentation for their quality systems. P6 highlights the importance of document control systems in ensuring that the right people review the right documents at the right time. He suggested that (i) all quality-related information is documented, accessible, and traceable, reducing the risk of oversight or errors, and (ii)

document control systems should be in place not only to support effective communication but also contribute to improving accountability.

P4 explains the manner in which the quality plan, which was derived from the requirements and performance criteria, led to the development of the checklists: “Every trade had its checklist, which was kept in the quality file, and the quality testing would occur accordingly”. Additionally, he discussed the utilisation of progress charts as a means to ascertain the alignment between planned and earned values. Based on their experience, P4 and P5 have discovered that low-rise projects tend to exhibit a reduced emphasis on specific QA and QC practices, such as the use of checklists and quality plans. According to O'brien, (2013), QA and QC help identify potential issues early in the construction process, allowing for timely corrections and reducing the risk of major problems or failures later on.

The results within this theme expand upon the findings of theme two and highlight the influence of a recurring pattern of five primary barriers on the quality process, quality assurance, and quality control of unique high-rise building scenarios in Malta:

| |
|---|
| 1. The low-rise mentality of the client and employee, a paralysed mindset from the beginning |
| 2. Low levels of communication, collaboration and teamwork |
| 3. Inconsistent adherence to standards |
| 4. Lack of involvement of quality team management experts (third parties) |
| 5. Resistance to documentation |

According to the participants' viewpoints, these five barriers suggest that all stakeholders must collaborate and take proactive measures to enhance the quality of processes, assurance, and control. The persistence of a low-rise mentality within high-rise buildings suggests the necessity of beginning with the person and their foundational beliefs to cultivate a collective comprehension. Adopting new mindsets to enhance project quality

management in the construction industry has been a well-documented subject in the relevant literature (Alawag, 2023; Nguyen et al., 2018). In this context, theme 3 prompts the question: Is it possible for us to initiate a process of cultivating a culture of quality, which serves as the fundamental basis for ensuring quality in high-rise construction works in Malta? Neglecting this particular stage may give rise to many issues, such as the need for further modifications. This next theme will elucidate the difficulties and advancements associated with reworks in high-rise constructions.

## 4.5 Theme 4: Quality Management Challenges That Increase Reworks Bring Attention to the People Level

Theme 4 presents the outcome of poor quality management in high-rise projects through the experiences and perspectives of six project manageres in Malta. Poor quality management in construction projects can lead to an overall cost increase ranging from 6% to 15%, primarily due to the expenses associated with rework, defects and material wastage (Nokulunga et al., 2019). The participants' responses reveal various challenges in quality management within high-rise projects that increased the risk of reworks at the people, construction and design levels. Further, the participants' comments provided valuable insights into the lesson learned from their experience, suggesting areas that could be improved. Using Love and Smith (2003) three levels for generic cause and effect of rework, the emerging challenges that impact reworks in high-rise projects are organised and presented below at the (1) construction and design level and (2) the people level.

### 4.5.1 Challenges that may contribute to reworks at the construction and design level

P1 and P4 stated that high-rise projects present greater challenges than low-rise structures due to the possibility for significant programme implications caused by the complexities of high-rise construction projects. Such insights indicate an interrelationship between project complexity, problem resolution, program timelines, budgets and planning in large-scale projects.

#### 4.5.1.1 Vertical transportation and logistic issues

On the one hand, P6 deliberated over the difficulties associated with vertical logistics in tall construction projects like transportation issues. He added that transportation efficiency, such as concrete casting and installation of building utilities, reduces as the structure's height increases. On the other hand, P5 indicated that there is always room for process improvement because the repetition of floors in high-rise construction allows workers to become more familiar with the work processes over time, between quality control, project cost, and the need for dedicated quality oversight. Verticality of high-rises demands more intricate designs and greater attention to detail regarding services and finishes. P2 highlighted the unique difficulties in high-rise projects, including concentrating services within smaller dimensions. P2 and P5 mentioned challenges related to a smaller footprint, intricate construction processes, logistical issues (e.g., steel fixing, casting of the base, water tanking), and the need to account for weather conditions, specific products, and constructability issues. These findings exemplify the relationship between the height of a structure and the logistical hurdles it presents, which can affect the efficiency of construction processes (Lai & Cheng, 2016). All of these aspects will have a significant influence on the reworks. P1 and P3 explained that more challenges in high-rise construction related to reworks are hidden costs, such as specialised equipment and safety measures, which can escalate project expenses in ways not typically encountered in low-rise buildings.

#### 4.5.1.2 Planning scheduling, and adherence to standards

In relation to the area of planning scheduling, P1, P2, and P5 highlighted the importance of timeliness and effectively managing resources, which includes several elements such as drawings, procurement, materials, and workforce. They emphasised that careful planning and scheduling are necessary for efficient quality control. Regarding adherence to standards, participants mentioned three main challenges that may contribute to reworks, including risk management, resources and enforcement of quality standards.

Firstly, P2 explained that identifying the source of the problem through risk management should be the first step to ensure quality standards, followed by a plan to ensure that it will not reoccur. P6 put forward a suggestion to mitigate this issue:

> *"… ideally it would have premeditated itself through a sample, a sample instalment, a mock-up, and that is the time that one would ensure that the quality standard are reached" (P6)*

P1 and P2 highlighted the importance of planning and quality control to prevent reworks. This evidence supports previous research claiming that such issues need to be properly discussed and determined at the inception stage since this will impact the entire project (Ali & Kamaruzzaman, 2010; Zwikael, 2006). Similarly, Love and Li (2000) remind us how important it is to avoid repeating such mistakes. Secondly, P5 learnt that the importance of investing in quality resources to ensure the overall success of a project is critical. He mentioned a problem when the materials appeared not to be according to standards and had to be referred to consultants for laboratory tests to ensure that the materials were according to specifications. When the root cause of the problem was rectified, remedial measures were taken to ensure there would be no similar issues in the future. It was also stated that the rectification sequence was all monitored and documented. Thirdly, all participants agreed that the state is essentially doing nothing to enforce quality standards in construction projects in Malta. They describe the situation as chaotic, with no effective measures to guarantee the quality of high-rise and low-rise building projects. P6 highlights the absence of a comprehensive building code and licensing system for various construction professionals, including project managers. P6 argued that this lack of regulation makes it challenging to ensure that the right people with the necessary skills are involved in construction projects:

> *"The State therefore should have urgency to address the regeneration of the industry from a qualitative, management, expectation, respect to developers, respect to third parties, and respect to people working on a site to be able to turn this around." (P6)*

#### 4.5.1.3 QA and QC processes, tendering and quality checking mechanisms

Most participants highlighted challenges and improvements about reworks concerning QA and QC processes, tendering process, and quality checking mechanisms, which would keep everyone accountable if implemented effectively and sequentially. P4 suggested separating the quality set-up from the contractor and having it as an independent body to reduce reworks during the QA and QC processes because the project manager would have more access to information, transparency, and possibly hidden or screened problems would come to light sooner. P1 suggested strengthening improvements to avoid reworks during the QA and QC processes in high-rise projects, by including the provision of collection of documents before signing the contract and ensuring that these documents have specific terms about topics such as personnel management and fostering effective communication within the team.

In terms of the tendering process, P1 asserts that one may acquire knowledge from one's errors and, as a result, modify the tendering approach. He added that this modification encompasses the reduction of contractors involved in a particular project and the enhancement of communication efficiency among all stakeholders. P2 also highlighted the risk of proceeding without as-built surveys due to time constraints. P2 stressed that this should not be repeated in future projects, emphasising the importance of thorough documentation and risk assessment. During the tendering stage, P3 proposed that a condition be included to ensure that the contractors are required to have a designated individual presence on-site daily to oversee their team. Moreover, P5 highlighted the presence of quality-checking mechanisms, such as concrete inspections, as effective tools that may serve as a proactive measure to mitigate specific barriers in quality management. He also emphasised that quality at work may increase by verifying whether ongoing work satisfies design needs and specifications and, in certain situations, needing to take stock and start from scratch to align with the project's requirements.

#### 4.5.1.4 Design issues

From a design point of view, P6 reflected on the early underappreciation of sustainable design in buildings and stressed its growing importance:

> *"…in the last ten years, the management of sustainable design, which is a very important ingredient of quality today and will be more so in the years to come, also requires some renovation as part of it would need a very strong character and experience under one's belt." (P6)*

P4 stated that a primary difficulty within design detailing was related to the façade, mainly when dealing with intricate façade architecture and integrating several aspects, akin to artisanship - when combining curtain wall systems with glass balustrades and alucobond panels. To maintain a high degree of final look and performance in high-rise projects, façade design and manufacturing quality must be examined, monitored, managed, and enhanced (Chung & Mutis, 2020). P4 added that ensuring quality control and assurance for this project posed significant challenges. The primary concern pertained to details rather than design, which was seen as one of the most important deficiencies. In this light, P1 and P4 highlight ineffective practices due to design coordination in the local context. P4 pointed out the,

> *"…inefficient methods of design coordination because in Malta, predominantly, 90% are not BIM managed. We still feel its problems and specification writing. For me that is the baseline and if that is already at fault, then let alone when it comes to managing to reach your targets." (P4)*

High-rise construction poses specific challenges that require a more specialised and detailed approach (Lucko et al., 2014). P2, underscores the complexities associated with unconventional systems and the need for specialised intricacy engineering expertise to manage such aspects. P5 also mentioned the link between design and façade architecture from an external factor point of view. He suggested that high-rise buildings have significantly elevated wind pressures on their facades, necessitating intricate design and structural considerations. This external element exemplifies the interconnectedness of the height of a building, the stress exerted by wind, crane operation limitations, and the intricacy of its design. External factors, including the weather, waste and the environment,

were also experienced as high-rise construction challenges that contributed to reworks by all the participants. Similarly, the work of Yi (2022) points out that high-rise buildings need structural soundness, fire safety, wind resistance, seismic event resistance, and energy efficiency. The following section will further unfold the challenges contributing to reworks, and the improvements suggested to mitigate them from the people's level.

### 4.5.2 Challenges that may contribute to reworks at the people level

#### 4.5.2.1 Client's expectations and decisions

When discussing problems contributing to reworks, the participants resurfaced the client's attitude and mindset challenge. They added other factors that challenged quality, including the client's expectations and decisions within high-rise projects. For example, P4 noted that the:

> *"…number one challenge is the client's appreciation, who wants to pay money to manage quality. I fear the client would expect that this comes part and parcel with the contracting, whereas, as you know, most of our contractors are not geared to manage quality, and once you know all this, you cannot expect this to happen. Still, you need to sustain it, ask for it, or make it clear at the procurement stage that you will be emphasising it. This, more or less, we have reached." (P4)*

On the same vein, P1 identified several challenges encompassing the client's awareness of the necessity for quality management, the competency level of available resources. These collective challenges highlight the pivotal role of client awareness, resource competence and effective project management practices to mitigate reworks. Similarly, P2 and P6 emphasised that a significant obstacle in quality management contributing to reworks lies in the client's willingness to allocate financial resources to support it.

#### 4.5.2.2 Contractor decisions, selection, competition, and shortcomings

P6 noted that when the client's decisions are grounded in cost, it may lead to jeopardising the reliability of the contractor's quality management system in high-rise projects:

> *"Sometimes, I have been involved in projects where tall buildings were built and because of the fact that wrong things were put together because they were chosen only on the basis of cost, failed tremendously and ended up paying way more also through the process of replacing a contractor for example, half way through the project." (P 6)*

In conjunction with the statement above, P3 explained that contractors work according to the contract and nothing else unless paid for the extra effort. Almost all interviewees mentioned that checking the quality of the contractors' previous projects and whether they have sufficient resources to comply with the project requirements is very important when selecting contractors and subcontractors. P4 stated that at the contractor's level,

> *"…contractors are able to execute those expectations and prove that the quality being stipulated has been reached."(P4)*

P1 argued that procurement could be a major issue in Malta (a small island state) because finding an ideal contractor is extremely difficult. In light of this challenge, the contractors' selection, P2, P4 and P6 suggested that a multi-criteria evaluation methodology that encompasses other elements beyond financial considerations, including but not limited to health and safety measures, supply chain management practices, professional expertise, and quality assurance procedures should be promoted. Their suggestions are underpinned by qualitative and quantitative factors, crucial for making informed decisions and emphasising the significance of a contractor's historical performance, reputation, reliability, and proficiency in the selection process. These findings support previous work emphasising the importance of criteria for selecting contractors and subcontractors during procurement who will be entrusted to perform the work (Love, 2002). P1 highlights the entry of foreign contractors into the market and how it has introduced competition and efficiency in a Maltese high-construction scenario. He suggests that local contractors should embrace new construction methods and technologies to enhance efficiency and reduce costs.

Another challenge mentioned by P3 was the shortcomings on the part of contractors who would choose materials and handling techniques that give the fastest production rates (quantity) above those that encourage safe working conditions (quality). The collective

opinion of the participants emphasises the importance of external factors, such as client expectations and quality management procedures, in promoting a proactive approach among contractors to ensure construction quality. According to a recent study conducted by Farrugia (2019), it was found that contractors in Malta tend to exhibit a reactive approach, focusing solely on fulfilling contractual obligations without going beyond them.

#### 4.5.2.3 Lack of human resources and limited capability

Regarding human resource capability, P3, P4, and P5 indicated that a shortage of responsible and skilled workers compounds the challenge, making it difficult to work without supervision and leading to potential defects. The emphasis on having the right people on board as early as possible (P1, P5) aligns with the need for competency and knowledge among consultants. P6 explains that assembling a skilled team with the right collaborative nature is crucial for high-rise projects. However, he insists there is a risk of selecting team members solely based on cost considerations, which can have adverse consequences. P4 added that:

> *"…the level of competence of the resources that are available in Malta lacks training. In addition, in terms of agencies that do quality control independently, the same, there is not much of a variety to choose from, and I fear they, too have their own shortfalls." (P4)*

This evidence related to a competent workforce highlights the interconnection between team selection, skill sets of all stakeholders involved, and the overall success of quality management, emphasising the need for a competent and skilled workforce to meet quality standards. P2 strongly argued that for high-rise projects, all individuals involved need to hone a set of specified skills:

> *"The first thing, I would say, is certainly we need to make sure that everybody who is building a high-rise needs to realise that this is a complicated project, way more complicated than any other ten, twelve story building, requires a skills set which is different and where quality needs to be defined in its entirety." (P2)*

In view of the statement above, P4 experienced recruitment processes that did not specify minimum qualifications or experience requirements and thus acknowledged this as an oversight. They rectified this by exerting pressure on the contractor to onboard more qualified personnel. Hampson et al. (2001) highlighted that a primary cause of rework in construction projects is inadequate site supervision, often resulting from a lack of experience and training. This deficiency has a considerable impact on both the effectiveness and overall performance of the project.

P1 and P6 further described that an effective quality management framework hinges on the presence of an experienced project management team. P1 stated that this could be achieved "by creating a simple and easy quality management system that works and is approved to be complete sufficiently and user-friendly end result". P6 specified that the project management team should possess the ability to recognise both strengths and weaknesses early, concentrate on meeting objectives, assess progress, and enforce accountability. P6 proposed:

> *"I would go for whatever science, research and experience can bring to the table to bring about the right team, vulnerabilities, mindset, and collaborative environment to ensure that the project is delivered with the minimum of risk and the highest of standards." (P6)*

P6 shared his experience of assembling multidisciplinary, multi-international teams to reassure stakeholders about the project's success and emphasised the importance of team composition in de-risking the project, controlling costs, and maintaining quality. P1 emphasised that a fundamental aspect of successful quality management is ensuring that the project team is experienced in quality management principles. This supports previous research showing that team composition, risk mitigation, cost management, and quality assurance all prioritise customer satisfaction and employee involvement (Patel & Pitroda, 2021). Patel and Pitroda (2021) stated that TQM reduces errors by introducing standards, rules, and process requirements. TQM involves all stakeholders to achieve complete quality and match customer or client expectations within budget and time restrictions, according to Femi (2015).

#### 4.5.2.4 Coordination and Communication

P1, P3 and P5 underlined that coordination is the key to avoiding mistakes, such as coordination between top management, designers, architects, engineers, services and finishes at the construction site. P4 also remarked that coordination between the main stakeholders at the initial stages (design phase) before they go to the implementation stage is essential. P3 discussed instances where work was not of the desired quality due to lack of coordination, necessitating rework. He explained that:

> *"There were reworks because there were works which were not of the desired quality or not accordingly and we did not want them and made them break down everything. It did not affect us financially, but in time wise it did because others are held back too then… based on personal experience, effectively managing the connections between timelines, quality, and costs is a significant challenge." (P3)*

This finding highlights the key interrelation between the quality of workmanship and project timelines (Chauhan et al., 2009). P3 and P5 pointed out the presence of foreign workers in Maltese high-rise projects, resulting in language barrier challenges. Addressing the challenge of multilingualism within such large-scale projects was identified as an area for improvement to mitigate reworks.

#### 4.5.2.5 Employee's sense of ownership and the well-being

Another angle that emerged from the challenges grounded at the individual level, one that includes workers and customers, was the well-being perspective. P6 claimed that,

> *"…one very important contributor to the quality of projects is the wellness not only of the person during the construction but even more. Wellness is a measure, so quality, unless measured, is not real, as the managers will tell us, and every ingredient of quality is measured at the level of development construction through LEED certification. But it also can be measured after the project is complete… so a very wide aspect."(P6)*

This statement sheds light on the well-being aspect before and after construction as another challenge to quality in high-rise projects (Börnfelt, 2023; Dobrodolac et al., 2010). Through the same lens, P1 emphasised the employee's sense of ownership and belonging to ensure quality management as this may eventually impose a considerable barrier, particularly in organisational culture and structure. He emphasised the significance of valuing one's work with pride and care. The study conducted by Aichouni et al. (2014) underscores that organisational culture can pose a significant challenge to effective quality management, acting as an inherent barrier that obstructs the successful adoption of quality management strategies and standards.

The evidence that frames Theme 4 is summarised in Table 6 below to provide a visual snapshot of the ten emerging key challenges contributing to reworks in high-rise projects, as experienced by six project managers in Malta. For each challenge, the participants provided suggestions for improvements to mitigate reworks. The table below shows how the challenges at the people level outnumbered those at the construction and design level. This finding resonates with the key findings in Themes 2 and 3 where more emphasis was placed on individual stakeholders. Yet, it can be noted that the participants provided more suggestions for improvements to mitigate reworks when discussing the challenge of QA and QC processes, tendering processes, and quality-checking mechanisms. The design level was featured less often in the participants' responses.

| | Challenges | Improvements |
|---|---|---|
| **Reworks at the Construction and Design Level in High-rise Projects** | 1. Progamme implications | Planning in large-scale projects |
| | 2. Adherence to standards | • Risk management<br>• Rectification sequence monitoring and documentation<br>• Well-organised resource management<br>• Enforcement of quality standards through comprehensive building code and licensing system |
| | 3. Vertical transportation and logistic issues | • Demand more intricate designs<br>• Room for process improvement - repetition of floors allows workers to become more familiar with the work processes over time |
| | 4. QA and QC processes, tendering process, and quality-checking mechanisms | • Separate the quality set-up from the contractor and have it as an independent body<br>• Including the provision of collection of documents, with specific terms, before signing the contract<br>• Acquisition of knowledge from errors may result in modifying the tendering approach<br>• A condition should be included in the tendering process to ensure contractors have a designated individual present on-site daily to oversee their team<br>• Avoiding the repetition of proceeding without as-built surveys by incorporating thorough documentation and risk assessment<br>• Use quality-checking mechanisms as a proactive measure |
| | 5. Design issues | • The need for intricate design and structural consideration<br>• A deep understanding of sustainable design principles and their integration into projects to meet evolving industry standards |
| **Reworks at the People Level in High-rise Projects** | 6. The client's expectations and decisions | • The client needs to ensure that quality management is made clear at the procurement stage<br>• The client needs to be aware of the necessity for quality management, the competency level of human resources and effective project management practices.<br>• Client's decisions should not be grounded in cost as this will reduce quality. |
| | 7. Contractor selection, competition, and shortcomings related to contractor's decisions | • For the contractor's selection, a multi-criteria evaluation methodology should be applied<br>• Contractors to embrace new construction methods and technologies<br>• Promote a proactive approach among contractors to ensure construction quality |
| | 8. Human resource capability | • Team composition: an experienced project management team and assembling multidisciplinary and multi-international teams<br>• Creating a simple and easy quality management system that works |
| | 9. Coordination and communication | • Coordination between top management, designers, architects, engineers, services and finishes at the construction site, most notably at the initial stages before implementation.<br>• The increasing number of foreign employees creating language barriers should be addressed. |
| | 10. Employee's sense of ownership and belonging and the well-being of the employees and the persons that will make use of the building after completion | • To sustain a sense of ownership and belonging among employees, one should value their work with pride and care.<br>• All elements of quality should be measured through LEED certification so that the well-being of employees and end-users is not overlooked. |

***Table 6 Ten emerging key challenges contributing to reworks and suggestions for improvements in high-rise projects as experienced by six project managers in Malta***

## 4.6 Theme 5: Communicating for Coordination Enables Project Managers Improve Quality

This theme delves into the perspectives of project managers about the fundamental components that facilitate their attainment of exceptional quality in complex projects. The respondents offer comprehensive views on the responsibilities of a project manager in high-rise construction projects, emphasising the diverse range of attitudes, knowledge and skills crucial for achieving positive outcomes that lead to success. Similarly, Sunindijo (2015), argues that in high-rise construction project managers rely on their knowledge, skills, and tools to enhance quality management. A key finding in this section was the strong emphasis on communication and the overall ability to direct and coordinate teams and people through the required attitude, knowledge, techniques, skills and tools.

### 4.6.1 Project managers' curiosity, skills, leadership, and quality tools

P6 thinks it is the learning disposition of being curious that assisted him in improving quality management. On a different note, he shared how some project managers "uninspired" him and how this leads to failure rather than success as it "could ruin even a client and his team and his wealth sometimes". Similarly, P2 pointed out that he does not see many good project managers on the island, and there is a need for more project managers. He further explained that the success of a project manager lies in the "technical skills, communication skills and having a good team behind you". According to research, technical skills are the capacity to successfully apply project management knowledge to projects or programmes to meet schedule, quality, cost, and risk objectives (Gelbtuch & Morlan, 2015). Building on this argument, P6 pointed out an essential factor - the professionalisation of Malta's project managers' workforce. He stressed that the project manager needs to come out as a profession on its own, and the role needs to be defined more as a profession:

> *"…as we are transitioning this industry as well from one which is a bit rogue and amateur to one which is professional where the space for professional project managers is going to be on the increase and therefore the reliabilities and responsibilities of project managers will increase as well." (P6)*

Additionally, P2, P4, P5 and P6 identified that success significantly depends on their leadership abilities. P5 explains that leadership abilities and a sense of pride at work are significant benefits. The project manager's leadership qualities, as emphasised by P6, are viewed as crucial:

> *" …leadership is everything. Leadership is communication, it is also being fair, same visionary, having the experience when you have to foresight to see things happening, to deal with weak parts of the team in a supportive way." (P6)*

P4 stressed that the project manager needs to have problem-solving abilities and the capacity to foresee and address issues before they become significant problems, visionary thinking and the ability to navigate challenges. This evidence supports previous research claiming that leadership qualities include decision-making, problem-solving, motivation, and the capacity to inspire a shared vision to achieve a common objective (Baker, 2018). The study by Hanna et al. (2018) suggests that a project manager's performance depends on their capacity to leverage knowledge and experience in the execution of leadership, effective management decisions, and cognitive abilities throughout the project lifecycle. Moreover, P5 highlights that success relies on the project manager's necessity for focus, planning, and adaptability while P6 stresses discipline:

> "*The project manager has to be focused and have a permanent set-up when working on a high-rise project. That all that is required will be delivered on time, nothing will prevent him from working, and he should plan ahead for things like how the weather would affect the progress of the project." (P5)*
>
> *"The skills set are one of discipline, one of objectivity, one of being a very strong team leader, but one who will not take no for an answer." (P6)*

P3 further expands on the role, emphasising the need for a multidisciplinary background, including construction knowledge, technical competency, health and safety expertise, and an understanding of finishes. P2 discusses the importance of the project manager in high-rise construction being continually updated with knowledge related to innovative designs and new materials in quality management. Seymour and Hussein's (2014) findings suggest that project managers may be required to acquire new specialist skills to effectively respond to future demands. Interestingly, only P5 discussed the value of investing in high-rise construction-specific equipment and staff training for project managers to improve

quality management. Achieving this goal can be accomplished by demonstrating awareness and understanding of and employing a wide array of efficient tools and methodologies in all undertakings (Rever, 2007). Hills et al. (2008) add that project managers must depend on information and skills gained via formal training as well as practical experience. P1 and P6 emphasise the significance of experience in enhancing quality management for a successful outcome.

P1 expressed that his experience served as a primary tool and strategy for mitigating quality concerns in the high-rise project; he did not specify any tools and techniques. P2, P4 and P6 referred to their experience of using BIM and a document management system. They explained that despite incurring expenditures, the document control system provided users with notifications. P2 stresses the importance of putting critical information in writing to address issues promptly and using other tools such as Microsoft Project and control sheets to mitigate errors. The significance of health and safety as an essential management tool was also emphasised by P3, P5 and P6. Overall, when the six project managers were asked to discuss and provide insights into their experience regarding the tools and techniques used to identify and mitigate quality risks in high-rise projects, they all agreed that proactive risk identification and communication are critical. As demonstrated through further evidence below, this study highlights that communication for coordination emerged as the most prominent finding leading to a project manager's success.

### 4.6.2 Effective communication enables project managers coordinate quality management

All participants stress that the clear communication, both verbal and written, between the project manager and the stakeholders is essential for effective coordination leading to project success. P3 suggested that achieving success in handling large, complex, and high-quality projects is highly unlikely when solely entrusted to a single project manager. P1 emphasised the importance of a project manager being hands-on and an effective

communicator in different ways. Participants P1 and P6 highlight the importance of person-to-person communication. P1 declared that,

> *"…the project manager has to know his people and get their buying. That is his objective. He has to be able to get people into it and committed because if they do not care, it will not happen." (P1)*

This evidence is consistent with the research conducted by Zulch (2014), which indicates that effective communication is crucial in fostering a common understanding among team members, facilitating cooperation, and improving decision-making processes and project outcomes.

P2 also referred to the project manager as a good human resources people person and a good organiser. He further emphasised the importance of email communication. He mentioned clear and descriptive email subject lines to ensure that communication is well-documented and easily retrievable. Participant P6 emphasises the use of document control software platforms to ensure accountability and proper sign-offs pre-contract and post-contract communication:

> *"That level of accountability through a document control system was the basis to the secret of success and the identification of weaknesses." (P6)*

However, P2 stated that in his role as a project manager in high-rise projects, he relies on agreements between contractors and clients, emphasising open communication. On the other hand, P5 acknowledges the impact of technological advancements on the project manager's communication efficiency in the last decades, making communication more accessible and effective. P2, P3 and P5 further expands and discusses the importance of communication through the use of regular meetings involving the main stakeholders, including the project manager. Similarly, P4 and P6 mention using an online portal system to register all communication between parties, including project managers, contractors, engineers, and the client, to ensure high-quality communication and avoid project errors. Participants also highlighted the importance of the project manager advising clients on the significance of quality management from the outset. P4 mentioned that they used to hold a series of monthly risk meetings where the project manager, quality manager and risk manager would discuss the quality element. These meetings provide a platform for

addressing and resolving issues promptly. Zainal et al. (2019) noted that the primary factors that can result in project failure are deficiencies in communication within the project team.

Two participants (P4 and P6) summarised most of the findings above by providing a metaphoric conclusion to the argument on project quality management success and the project manager's role in high-rise construction. P6 states that:

> *"The role of a project manager is the glue that keeps everything together… The ability to combine the contributions of all the various specialists and moving parts of a project to a team of people using the right tools like BIM and document control. These are an essential part of what a true team leader would be." (P6)*

In the same way, P4 uses a metaphor, comparing the project manager to a "conductor directing the orchestra". He explained that the project manager has a group of musicians, and he has to direct them, coordinating a competent team. Thus, it can be argued that the project manager is not the only one responsible for the success of project quality management in high-rise construction. The conductor cannot produce a quality symphony on his own, musicians need to play quality, too.

Theme 5 shows how the six participants in this study prioritised the communication skills between the project manager and other stakeholders in high-rise projects for effective coordination. This supports the work of Gaddis (1959), which was published approximately sixty years ago. Gaddis was the first to document the responsibilities of a project manager, asserting that effective communication skills are essential for project managers to successfully deal with budgetary and technological matters. The project managers' learning disposition of being curious, technical skills, leadership qualities, the professionalisation of the workforce, the tools and techniques used, the specific knowledge and ongoing training required, focus, planning, adaptability and practical experience were also highlighted as other critical elements that a project manager needs to possess. This section serves as an eye-opener to a highly visible role in literature, yet one in which many people are completely bemused by what they actually do and the difference they make. The evidence in this section confirms that the symphonic orchestra of project quality management will not play without a competent project manager that possesses excellent communication

skills for effective coordination. Yet, the evidence in this study also shows that a project manager's competencies are not enough to enact successful project quality management in high-rise projects. The project manager can function if a competent system that has developed a shared understanding of project quality management in high-rise construction addresses several political, economic, social, and cultural issues.

## 4.7 Overall Key Finding: Ten Success Factors, Quality Culture, Professionalisation, and Project Managers' Communication for Coordination

This chapter encompasses the analysis, findings, and discussion derived from the data obtained from six interviews conducted with project managers in the high-rise building field in Malta. The study's comprehensive analysis reveals that the emergence of five distinct themes has yielded intriguing findings. However, to fully comprehend the implications and present a holistic understanding, it is necessary to broaden the scope and examine how these themes converge to offer the most optimal response to the research question. This section presents a comprehensive overarching finding summarising the insights gained from examining project quality management in high-rise construction. The overarching key finding of this study was determined by analysing the recurring patterns found within the five emergent themes discussed in this chapter, ultimately providing a conclusive response to the research question. The three elements of the central conclusion are consistent with the conceptual framework and reinforce the theoretical basis of this study.

After integrating the ten essential components for successful project quality management (Theme 1) and the ten challenges in quality management that contribute to reworks (Theme 4) in high-rise buildings, as determined by six project managers in Malta, it became evident that there were commonalities. This intriguing discovery resulted in the identification of ten success factors for project quality management in the context of high-rise construction as perceived by six project managers in Malta (Table 7).

| Critical Factors to Successful Project Quality Management in high-rise building projects | Quality management challenges that increase reworks in high-rise building projects | Ten project quality management success factors for high-rise construction |
|---|---|---|
| Precise organisation of logistics, particularly in vertical logistics | Vertical transportation and logistic Issues | 1.Precise organistation of vertical logistics |
| A feasible project timeline taking into account the scale of the project and complexity issues | Progamme implications | 2.Good planning according to the scale of the project |
| Address elevated risk due to structural concerns | Design issues | 3.Good design addressing high risks due to structural concerns |
| Stakeholders to recognise the value of quality standards and sustainability | Adherence to standards | 4.Valuing quality standards and sustainability |
| Invest in quality management through a whole set-up to mitigate costs | Coordination and communication | 5.Quality management team investment to achieve effective communication and collaboration |
| Meeting client's expectations | The client's expectations and decisions | 6.Meeting client expectations and addressing mindset for smart decisions |
| Quality management team to prioritise the pre-execution phase | QA and QC processes, tendering process, and quality-checking mechanisms | 7.The quality management team should focus on pre-execution for successful QA and QC. |
| Consultants in large-scale projects should be in it if they are competent | Contractor selection, competition, and shortcomings related to contractor's decisions | 8.Competent consultants and contractors with the right mentality to prevent decision-making flaws. |
| The project manager to be involved from the start | Employee's sense of ownership and belonging and the well-being of the employees and the persons that will make use of the building after completion | 9.The project manager must be involved early on to oversee project quality management and promote a sense of ownership, belonging, and well-being among stakeholders and end-users. |
| The need for foreign expertise | Human resource capability | 10.Strengthen human resources capabilities and employ global expertise. |

***Table 7 Six Maltese project managers identify ten quality management success factors for high-rise building projects.***

Additionally, two crucial elements for project quality management in high-rise construction growth in Malta emerged when the five themes were combined to find the most prevalent patterns:

(i) *The need to promote a quality culture in high-rise projects as a result of client, contractor, consultant, and project management perspectives on quality management.*

(ii) *Building a professionalised workforce by emphasising the importance of developing all stakeholders' human resources capabilities, knowledge, skills, and ongoing training for continuous improvement, with a particular emphasis on ensuring that project managers have excellent communication skills for coordination.*

The merged data strongly emphasises that construction quality necessitates a shift in mindset to foster a quality culture among all stakeholders within the sector, wherein a collective continuous commitment to attaining excellence is prioritised over the simple adherence to minimum acceptable norms. This aligns with the topic of changing mindsets to enhance project quality management within the construction industry, which has been thoroughly examined in the 21st st century scholarly literature (Alawag, 2023; Nguyen et al., 2018;). The identification of five emerging themes also underscores the importance of stakeholders' human resources capabilities. Particularly, the participants recognise the significance of the project management profession and its capacity to effectively organise, communicate, and coordinate all relevant stakeholders within a proficient framework, as demonstrated in prior scholarly investigations (Al-Hajj & Zraunig, 2018; Crawford, 2004; Hannah et al., 2018; Kulej-Dudek, 2021; Liikamaa, 2015). Current scholarly literature emphasises the pivotal role of the project manager, a leadership position Cissna and Schockman (2020), in assuming ultimate authority and accountability for overseeing a project's quality management, hence ensuring adherence to established standards (Kerzner, 2017; Patel & Pitroda, 2021). A recent study highlights that future studies should devote more attention to human resource management, emphasising people and their soft skills (Peric et al., 2021). The provided evidence supports

the reasoning of designating the project manager as the conductor of the orchestra, as described in P4's metaphor that draws a comparison between the project manager's position and that of a conductor who guides an orchestra (Figure 12). The individual who has the highest position within an orchestra is often known as the conductor. In the present era, prestigious philharmonic and symphonic orchestras rely significantly on conductors for their direction and guidance. In a similar manner, it is noteworthy to acknowledge that, as per the testimonies of the participants, the project manager holds a pivotal position in guaranteeing effective project quality management. Yet, it is important to highlight that their professional standing is not acknowledged in Malta. The Malta Chamber of Construction Management (MCCM) is advocating for the implementation of warrants for construction project managers in order to promote professional behaviour within the industry (MCCM, 2023). The results mentioned above provide support for the ongoing demand to cultivate a professional workforce in the construction industry (Construction Industry Review Committee, Hong Kong, 2001). Specifically, the results of this study highlight the significance of the project manager's role in effectively managing project quality in high-rise construction projects (Zainal et al., 2017). The significance placed by the participants on the project managers' proficient communication for the purpose of coordination is evident in Kerzner & Saladis' (2011) assertion that "Professionalism in project management can be delineated as a collection of values, behaviours, and attributes exhibited by the project manager and perpetuated by the team." (p. 1).

The overall key finding of this study is reinforced by three fundamental components, which enhance the theoretical foundation of the research. These components pertain to the principles of Total Quality Management (TQM) and Kaizen philosophy, which focus on the continual improvement of processes and performance, and aim to positively shift employee and management mindsets and actions (Deming, 1986; Masaaki, 1986). Both philosophies emphasise a cultural shift towards encouraging operators to provide suggestions and actively engage in ongoing efforts to enhance activities. However, Saleem et al. (2012) highlight key differences between the two. The Kaizen concept is characterised by its adherence to a bottom-up approach - the employees propose recommendations for improvement. The concept of Total Quality Management (TQM), as proposed by Deming

(1986), incorporates both top-down and bottom-up approaches. Both senior management and workers inside the organisation play a role in identifying and introducing suggestions for improvement. Therefore, it can be concluded that this study's overall key findings, which emphasise the need for starting with the people involved at all levels, align more with the TQM concept. The TQM theory holds that operational excellence increases customer satisfaction and encourages everyone (top management and workers) in an organisation to focus on quality and sustained long-term improvement. Similar to an orchestra (Figure 12), the two parties, the conductor (the project manager) and the other employees responsible for project quality management (managers and workers at the top and ground levels), face each other and are mutually engaged in concerted efforts towards ongoing quality improvement.

**What can we learn about project quality management from the perspective of project managers in high-rise buildings in Malta?**

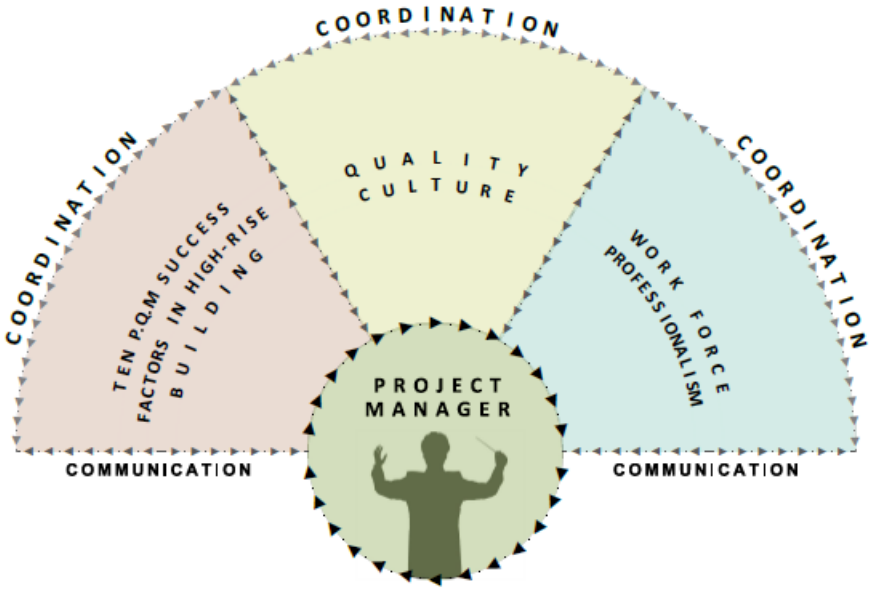


***Figure 12 Improvement to project quality management in Maltese high-rise building as suggested by six project managers***

In line with these theoretical perspectives, this study has shown that the phenomenon of project quality management in high-rise construction in Malta has the potential to result in a harmonious outcome if addressed promptly and with consideration for potential expenses. Figure 12 visualises how the six project managers in this study convey the key

message that the Maltese high-rise construction industry may benefit from a substantial cultural shift towards quality, the enhancement of workforce professionalism, and the identified ten success factors. Figure 12 also signs the participants' call for a growing appreciation and acknowledgement of the project manager's crucial function, effectively communicating to coordinate the contributions of all employees at all levels, thereby enhancing the overall quality management of high-rise projects through continuous improvement.

## 4.8 Chapter Summary

This chapter encompasses an examination, exposition of results, and discourse pertaining to the research investigation. The primary research question is addressed by the convergence of five themes, resulting in a single overarching important finding. The final discussion revolved around the key results, summarising the knowledge acquired about project quality management in high-rise buildings as explained by six project managers in Malta. It can be concluded that there is a need for a comprehensive approach to project quality management in high-rise projects in Malta. The proposed method may benefit from prioritising the success factors that have been discovered, cultivating a culture of quality, promoting effective communication and coordination within the workforce, and giving priority to practices based on competency, elevating the project manager's role. The study provides evidence indicating that this initial favourable course of action has the potential to become a significant turning point within the high-rise building sector in Malta.

# Chapter 5: Conclusion

# Chapter 5: Conclusion

## 5.1 Chapter Introduction

The primary aim of this study was to explore novel insights into project quality management by examining the viewpoints of project managers who had experience in highrise building projects within the contemporary Maltese construction sector of the 21st century. The preceding chapter provided a comprehensive account of the analysis, findings, and subsequent discussion derived from the conducted study. The objective of this chapter is to present a summary of the main findings, consisting of five significant discoveries and one major conclusion. These findings collectively offer the most optimal response to the research question - *What can be learned about project quality management from the perspectives of project managers in high-rise buildings in Malta?*

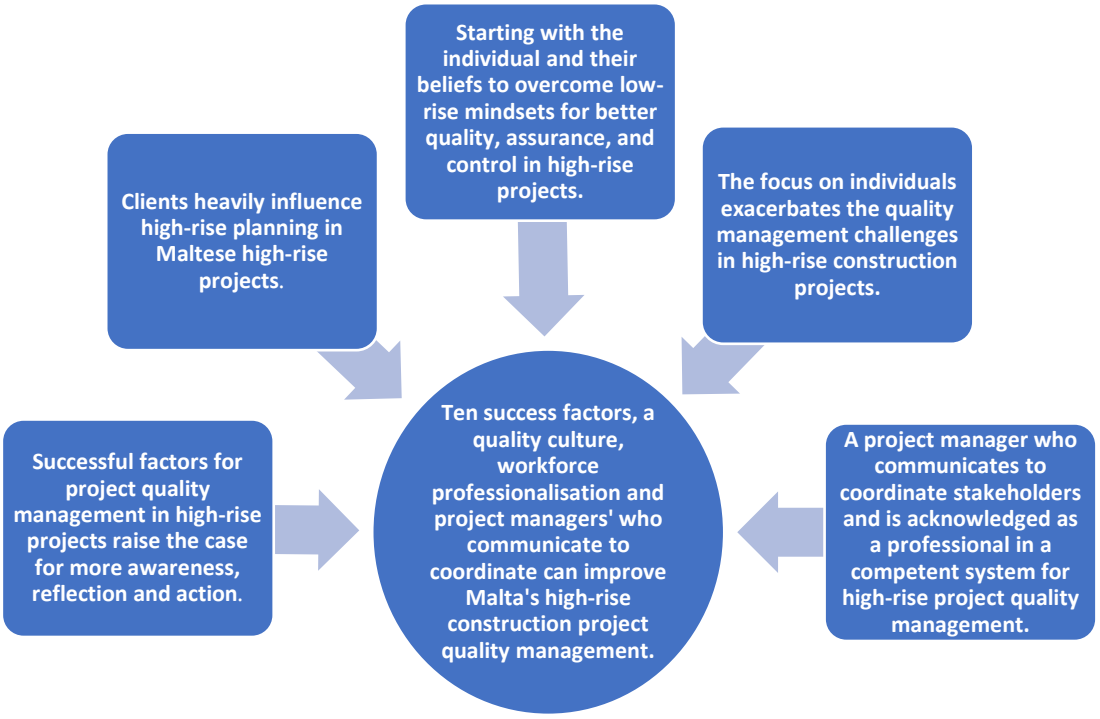


***Figure 13 Five key findings and one major conclusion that provided the most insight into the research question***

## 5.2 Key Finding 1: Successful Factors for Project Quality Management in High-Rise Projects Raise the Case for More Awareness, Reflection and Action

The initial significant discovery pertained to the participants' identification of ten essential factors necessary for successful project quality management in high-rise projects, drawing upon their expertise and experiential insights:

| |
|---|
| 1. Precise organisation of logistics, particularly in vertical logistics |
| 2. A feasible project timeline taking into account the scale of the project and complexity issues |
| 3. Address elevated risk due to structural concerns |
| 4. Stakeholders to recognise the value of quality standards and sustainability |
| 5. Invest in quality management through a whole set-up to mitigate costs |
| 6. Meeting client’s expectations |
| 7. Quality management team to prioritise the pre-execution phase |
| 8. Consultants in large-scale projects should be competent |
| 9. The project manager to be involved from the start |
| 10. The need for foreign expertise |

Key variables emphasised as vital for mitigating the higher risk factors associated with high-rise building development's complex and dynamic nature included vertical logistics, investment in project quality control, and possessing the necessary experience in high-rise construction. These findings align with previous research that highlights the many variables contributing to flaws in high-rise structures, such as insufficient project management, poor supervision, and the level of expertise among workers (Fromsa et al., 2020; Zainal et al., 2019). The participants stressed the need for project quality management in high-rise structures due to their complexity and management requirements (Fang, 2017). This key finding revealed a need for heightened awareness, reflection, and action among all stakeholders engaged in these projects.

## 5.3 Key Finding 2: Clients Heavily Influence High-rise Planning in Maltese High-rise Projects

Secondly, the evidence elucidated the significant impact of the client's decision-making on several aspects of the project, particularly the planning process. Research indicates that a lack of ability to make effective decisions (Zainal et al., 2019) and inadequate project planning can lead to structural defects in high-rise buildings, resulting in significant delays, safety hazards, and several other complications (Fegade & Bhangale, 2016; Habib & Erzaij, 2020; Sambasivan & Soon, 2007). Interestingly, the participants' accounts revealed several significant issues during the initial planning phase of a high-rise project, particularly the client's emphasis on cost and the client's mindset and culture on quality management planning and assessment. Thus, a strong link emerged between the client's attitude and inadequate project planning in high-rise projects. Similarly, the case study by Baffoe-Twum (2019) revealed that a significant factor contributing to substantial delays in building projects is the likelihood of owner-initiated changes throughout the construction phase.

## 5.4 Key Finding 3: Starting with the Individual and their Beliefs to Overcome Low-Rise Mindsets for Better Quality, Assurance, and Control in High-Rise Projects

The third significant discovery provides additional insight into the prevailing mindset of both the client and employee, revealing a lack of progressiveness from the beginning stages of the quality process, quality assurance, and control in the context of distinctive high-rise building scenarios in Malta. The influence of these attitudes on the quality process, assurance, and control of several high-rise projects was reported by participants. The topic of adopting fresh mindsets to improve project quality management in the construction sector has been extensively discussed in the existing academic literature (Alawag, 2023; Nguyen et al., 2018; Park & Seo, 2023). The participants highlighted how this issue in Malta leads to insufficient communication and collaboration, an absence of professionals in quality team management, reluctance towards documentation, and inconsistent adherence to standards. According to several studies (Fang, 2017; Thapa et al., 2013; Voskresenskaya & Vorona-Slivinskaya, 2018; Yan, 2019), it has been shown that

ensuring quality control in high-rise construction projects poses significant challenges and requires adherence to more stringent quality standards compared to conventional building engineering. The argument posits that in Malta, there is a prevalent low-rise mindset within high-rise structures. Consequently, it is contended that to enhance project quality management, it is crucial to start the process by focusing on the individual and their underlying beliefs, as this serves as a critical step in fostering a culture of high quality (Construction Industry Review Committee, Hong Kong, 2001).

## 5.5 Key Finding 4: The Focus on Individuals Exacerbates the Quality Management Challenges in High-Rise Construction Projects

The participants identified ten key challenges that significantly impact the incidence of reworks in high-rise projects:

| |
|---|
| 1. Progamme implications |
| 2. Adherence to standards |
| 3. Vertical transportation and logistic issues |
| 4. QA and QC processes, tendering process, and quality-checking mechanisms |
| 5. Design issues |
| 6. The client's expectations and decisions |
| 7. Contractor selection, competition, and shortcomings related to contractor's decisions |
| 8. Human resource capability |
| 9. Coordination and communication |
| 10. Employee's sense of ownership and belonging and the well-being of the employees and the persons that will make use of the building after completion |

The frequency of issues encountered at the people level, involving the client, contractor, and human resource capabilities, surpassed those at the construction and design levels. The participants suggested several ways on how these challenges can be overcome. They provided more recommendations for mitigating rework concerning the challenges of quality assurance and quality control protocols, tendering procedures, and quality inspection techniques. Similarly, previous studies show that deficiencies in high-rise construction and the need for rework might arise due to insufficient quality control (Kazas et al., 2012) or poor workmanship (Chauhan et al., 2009; Hadi et al., 2022; Kazas et al., 2012; Sambasivan & Soon, 2007), eventually resulting in delays in project timelines.

## 5.6 Key finding 5: A Communicative Project Manager who Orchestrates Key Stakeholders and is Acknowledged as a Professional in a Competent System for High-Rise Project Quality Management

The participants emphasised the communication and coordination abilities exhibited by the project manager to successfully orchestrate stakeholders at all levels in high-rise projects. According to recent studies on high-rise construction, it has been said that inadequate communication among stakeholders and insufficient coordination among different parties are primary factors contributing to delays in the construction of high-rise buildings (Bafooe-Twum, 2019; Hadi et al., 2022; Sanni-Aniber et al., 2020; Sun et al., 2020; Zainal et al., 2019). This study adds that the successful execution of project quality management relies heavily on the presence of a proficient project manager, raising the case for a professionalised workforce. Zainal et al. (2019) highlighted project managers' capacity to organise, motivate, make accurate decisions, and oversee leadership abilities on-site as critical success factors for high-rise building project management. This study argues that the project manager's effectiveness in high-rise buildings also depends on implementing a competent system that effectively resolves many political, economic, social, and cultural factors associated with quality management in high-rise projects.

## 5.7 Overall Key Finding: Ten Success Factors, a Quality Culture, Workforce Professionalisation and Project Managers' who Communicate to Coordinate can Improve Malta's High-Rise Construction Project Quality Management

This study gives a complete synthesis of the insights obtained from the examination of project quality management in high-rise buildings, as perceived by six project managers. Five themes have produced intriguing findings, according to the study's detailed analysis. Broadening the scope and examining how these themes combine to answer the research question is required to fully appreciate the consequences and convey a complete understanding. The overall key finding of this investigation consists of three components.

*(i) Ten success factors for project quality management in the context of high-rise construction*

After consolidating the ten critical factors for successful project quality management and the ten main challenges encountered in quality management that lead to reworks in high-rise constructions, as outlined by six project managers in Malta, it became evident that there were commonalities among them. Therefore, the identification of ten success elements (see list below) for the management of project quality in the unique setting of high-rise building construction in Malta was achieved through a compelling research discovery:

| |
|---|
| 1. Precise organistation of vertical logistics |
| 2. Good planning according to the scale of the project |
| 3. Good design addressing high risks due to structural concerns |
| 4. Valuing quality standards and sustainability |
| 5. Quality management team investment to achieve effective communication and collaboration |
| 6. Meeting client expectations and addressing mindset for smart decisions |
| 7. The quality management team should focus on pre-execution for successful QA and QC. |
| 8. Competent consultants and contractors with the right mentality to prevent decision-making flaws |
| 9. The project manager must be involved early on to oversee project quality management and promote a sense of ownership, belonging, and well-being among stakeholders and end-users. |
| 10. Strengthen human resources capabilities and employ global expertise. |

Two more crucial elements that contribute to the overarching main discovery of this research surfaced throughout the process of discovering patterns within the five themes:

(ii) *The need to promote a quality culture in high-rise projects as a result of client, contractor, consultant, and project management perspectives on quality management.*

One of the key findings in the integration of the five overarching themes is the recognition of the importance of fostering a quality culture among all stakeholders in the Maltese high-rise construction sector. This entails a shift in mindset towards prioritising a collective and continuous commitment to achieving excellence in construction quality management. This finding aligns with previous research that emphasises the importance of shifting mindsets to improve project quality management in the construction industry (Alawag, 2023; Nguyen et al., 2018; Park & Seo, 2023). When commencing a project, it is essential to consider the stakeholders' viewpoints on project quality management. This study

demonstrates that the mindset of different stakeholders in the field significantly influences the approach, process, and outcome of the project, resulting in diminished quality.

*(iii) Building a professionalised workforce by emphasising the importance of developing all stakeholders' human resources capabilities, knowledge, skills, and ongoing training for continuous improvement, with a particular emphasis on ensuring that project managers have excellent communication skills for coordination.*

The identification of five emerging themes highlights the significance of the human resource capabilities of stakeholders for continuous improvement (Masaaki, 1986). Particularly, findings emphasise the importance of the project management profession in efficiently communicating to coordinate all relevant stakeholders within a proficient framework – like the "conductor directing the orchestra" (P4). This phenomenon has been exemplified in previous academic inquiries (Al-Hajj & Zraunig, 2018; Crawford, 2004; Hannah et al., 2018; Kulej-Dudek, 2021; Liikamaa, 2015). Specifically, these findings support the work of Zainal et al. (2017), which emphasises the significance of the professionalism of the project manager and his involvement in ensuring effective project quality management in the context of high-rise projects. The third and last component of the important results in this study presents additional data that supports the ongoing need for the establishment of a proficient and specialised workforce within the construction sector, "the most valuable asset in the construction industry" (Construction Industry Review Committee, Hong Kong, 2001, p. 6)

This study identified ten success factors for high-rise construction, promoted a culture of quality, and enhanced workforce professionalisation, emphasising the project manager's role to communicate and coordinate all stakeholders for effective project quality management. The synthesised findings align with the conceptual framework and strengthen the theoretical underpinnings of this investigation. Total Quality Management (TQM) and Kaizen philosophy aim to improve processes and performance and change

employee and management mindsets and actions – a strong link with the prominent findings of this work. Deming's (1986) Total Quality Management (TQM) combines top-down and bottom-up methodologies, unlike Kaizen. Senior management and employees identify and propose improvements. Thus, it can be concluded this study's main findings, which highlight starting with people at all levels, align more with TQM theory, which holds that operational excellence improves customer satisfaction and motivates senior management and employees to focus on quality and long-term progress. Based on the theoretical framework presented, it is posited that the quality management of high-rise construction projects in Malta can potentially reap advantages from the new insights that have been generated via this research.

## 5.8 Limitations of the Study

The study presents several advantages and limits that are worth considering. Due to the limited scope of this study, it is not possible to extrapolate or deduce the responses, ideas, and opinions of the participants in a broader context. The study's limitations arise from its reliance on the perspectives of only six project managers who have work experience in high-rise buildings in Malta. More interviews were not possible due to the scale of this study and time constraints. The limited sample size restricts the ability to make generalisations about the viewpoints of all project managers in Malta regarding the research topic under investigation. The consideration of limited sample size of six project managers in Malta was considered throughout the stages of interviewing, transcription, and analysis. However, it is believed that all stakeholders, policymakers, and project managers in the high-rise construction industry can benefit from the findings and conclusions presented in this study. One additional limitation is that irrespective of my efforts to maintain impartiality during the interview, there exists the potential for my presence to have inadvertently impacted or altered the responses provided by the participants. Achieving complete objectivity in research is an unattainable goal (Wellington, 2015).

## 5.9 Implications for Policy and Practice

Based on the primary findings, the following recommendations are proposed at both the policy and practical levels in order to progress towards the achievement of efficient project quality management in the context of high-rise buildings in Malta:

- At the governance level, more effort is needed by the regulators and authorities in Malta to convince all stakeholders of high-rise construction projects about the benefits of quality-focused procurement policy, quality standards, and guidance, which in turn leads to the improvement of performance in construction projects.
- It is imperative for the government to prioritise the revitalisation of the industry by focusing on aspects such as enhancing its quality, improving management practices, meeting stakeholders' expectations, and demonstrating respect towards developers, third parties, and on-site workers. This concerted effort is crucial in order to effect positive change and reverse the current situation.
- The development of high-rise buildings necessitates a meticulous organisation of logistics, thorough planning commensurate with the project's scale, and a specific design approach that effectively mitigates high risks associated with structural considerations.
- It is fundamental for stakeholders engaged in high-rise projects in Malta to recognise and conform to a plan encompassing quality standards, ensuring its implementation from the project's inception and throughout each subsequent step, in order to mitigate the need for rework.
- High-rise project need to place significant emphasis on prioritising sustainability within the realm of project quality management.
- In the context of high-rise construction projects, it is essential for the client to furnish a budget and allocate resources towards the recruitment of a proficient management team. The involvement of the quality management team from the outset is crucial in assuming accountability and leadership in the planning and execution of the quality management system.

- Continuous professional development and training programmes for high-rise building stakeholders should go beyond knowledge and skill gain. Training should also include values and mindset development to establish a quality culture.
- A system is needed to professionalise the high-rise construction workforce and increase professional development. All stakeholders must continuously increase their knowledge and stay current with high-rise construction industry innovations through education and professional growth.
- Project managers working in high-rise projects require the necessary beliefs, knowledge, and skills to create a positive environment and enact effective communication for coordination among all stakeholders. This makes a case for Malta's project managers to be recognised and valued as licensed construction professionals. A competent system in Maltese high-rise construction is needed because project managers' efficacy depends on their ability to address many political, economic, social, and cultural variables related to quality management in high-rise projects.

## 5.10 Recommendations for Future Research

- There is a necessity for conducting research aimed at identifying the underlying factors contributing to schedule overruns in the programming of high-rise construction projects.
- There is an imperative need for doing research in the domain of high-rise construction in order to effectively distribute the expenses associated with reworks and delve into the underlying causes contributing to this matter. Measuring quality cost can help users understand rework and preventive measures.

## 5.11 Significance of the Study

This work makes a valuable contribution to the expanding field of project quality management in high-rise structures. By conducting refined analyses and gathering insights

from six project managers in Malta, this research has generated novel understandings in this area. The major findings provide a more profound understanding of the potential knowledge and benefits that may be obtained while examining disputed issues in the construction industry, such as the construction of high-rise buildings in a small island state. These issues, which may initially appear distinctive or challenging, can be better comprehended when approached from a wider and innovative perspective. The study's contribution to knowledge may serve as a foundation for reflection and practical action aimed at improving project quality management in high-rise construction in Malta. This study carries several implications that warrant a proactive reaction, particularly in terms of policy development and improvement efforts. Ultimately, this research has the potential to function as a valuable reference for all parties engaged in high-rise buildings in Malta and other relevant contexts.

## 5.12 Chapter Summary

With the aim of capturing the perspectives of six project managers who have experience in high-rise projects in Malta, my research was centred on generating fresh insights into project quality management. The study's primary outcomes offer significant insights into the high-rise construction sector in Malta, serving as a valuable resource for stakeholders to enhance project quality management in large-scale endeavours. The study refrained from proposing a one solution. By adopting the dual lens of Kaizen philosophy and TQM , this study concludes by highlighting the necessity of a fundamental change in thinking that could foster a culture of quality in the Maltese high-rise construction industry. Additionally, this study's key findings emphasise the importance of professionalising the workforce, acknowledging the value and crucial role of the project managers, and promoting awareness of success factors in high-rise projects based on the real-life experiences of six project managers. The key findings are expected to serve as guiding factors that direct both individual and collective introspection and action, based on the conviction that stakeholders' perspectives on quality, professionalism, and project quality management in high-rise construction are an ongoing process of enhancement, aiming to attain excellence in high-rise projects through continuous improvement (Deming, 1986; Masaaki, 1986). It

is imperative that the prompt deployment of effective project quality management in high-rise projects in Malta and other countries is prioritised, as any postponement in its execution is ill-advised.

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# Appendix A

Indicative research questions for individual semi-structured interviews with Project Managers (Experienced in High-rise Buildings Projects) – Exploratory study

General Questions

1. From your knowledge and experience, how would you define quality management in high-rise buildings compared to low-rise buildings?
2. Why should quality management in high-rise buildings be critical to the construction industry?
3. What kinds of difficulties were distinct from low rise throughout this high-rise project?
4. How do you Gauge quality management in a high-rise compared to a low-rise? What type of requirements and expectations are needed in a high-rise?
5. At what stage/s have you been involved or engaged in the high-rise construction project? Pre-construction phase or during the construction/implementation phase?

Planning

6. Did you have a project brief to follow for the high-rise project? If so, what were the main objectives, scope and requirements concerning quality for a high-rise project?
7. How did you plan the quality of deliverables throughout the project lifecycle, at the implementation stage, in the high-rise building you were involved in?
8. Did you use Quality requirements standards for this high-rise building project? If so, what standards do you use for this high-rise project?
9. What type of setup plans were used to ensure quality measures during the project cycle?

10. From your experience in this high-rise project, do clients prioritise quality, cost or time? What are your views on this? Did you find a backup and support from the client?

DO- Application and Processes

11. What type of practices or processes were implemented to achieve quality goals in this high-rise project?
12. How do these practices and processes you mentioned compare to other practices and processes of low-rise building projects you were involved in?
13. How did you ensure that quality standards were met in this high-rise building project?
14. During this high-rise project, what type of measures and control processes did you apply to achieve quality at a project level?

Check -Performance Evaluation

15. What type of factors impacted project quality performance? How does this compare to other low-rise projects you worked on?
16. What system was used to measure the quality cost in this high-rise building project?
17. What type of factors contributed to reworks in this high-rise project?
18. What steps did you take to measure, mitigate and resolve reworks in this high-rise project? How did you manage to resolve them?

ACT- Improvement

19. What would you define as a challenge/barrier in quality management throughout this high-rise building project?
20. How did you identify areas for improvement through your project management approach in this high-rise project?
21. What steps did you take to improve any barriers during this high-rise project?

22. What would you define as successful quality management throughout this high-rise building project?
23. Would you do anything different today, in view of the identified barriers and steps taken for improvement in this high-rise project?
24. Can you describe a situation where you learned a valuable lesson from this high-rise project and how you can apply that lesson to future projects?

Role, Skills, Tools and Techniques of Project Manager

25. How would you define your role as a project manager in the high-rise building project/s you experienced?
26. Which skills are most important? And which skills are needed for high-rise buildings?
27. What tools or techniques did you use to identify and mitigate quality risks in the high-rise project?
28. What type of communication did you use during the high-rise building project?
29. How did you ensure that you are using good communication to avoid project errors and that all team members understand the quality requirements and standards for the project?
30. What are your prospects when it comes to the role of the project manager and high-rise building projects in Malta?

Opinion and New Challenges

31. Do you think the state is doing enough enforcement related to quality in high-rise building projects?
32. Contractors in Malta are proactive or reactive regarding quality control measures? Explain why?
33. In your opinion, what should be the criteria in the selection process of contractors?
34. What about new challenges and requirements in future for high-rise buildings?
35. In your opinion, which are the three most important factors to consider which make a difference in quality management related to high-rise buildings?