

The impact of Project integration management to
improve the projects quality: applied to the technology
sector, Qatar.

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Dedication

Abstract

Purpose:

Methodology:

Findings:

Originality & Implication:

Keywords:

Table of Contents

Acknowledgment.....	1
Dedication	2
Abstract	3
1. Chapter 1: Introduction.....	7
1.1. Research Background.....	8
1.2. Research Problem.....	12
1.2.1. Theoretical Gaps	13
1.2.2. Practical Gaps.....	13
1.3. Research Significance	15
1.3.1. At the theoretical level.....	15
1.3.2. At the practical level.....	15
1.4. Research Questions	17
1.5. Research Objectives	17
1.6. Research Hypotheses.....	18
1.7. Research Model	19
1.8. Scope of The Study	20
1.9. The Project Structure.....	21
2. Chapter 2: Literature Review	22
2.1. Introduction.....	23
2.2. The independent variable	24
2.3. The dependent variable	26
2.4. The relationship between the independent and the dependent variables	30
2.5. Conclusion	33
3. Chapter 3: Research Methodology.....	35
3.1. Introduction.....	36
3.2. Operational definitions for research variables.....	36
3.3. Research design (research onion)	38
3.4. Research population & Sampling methods and technique	39
3.5. Data collection method	40
3.6. Types of data.....	44

3.7. Statistical analysis procedures	45
3.8. Conclusion	46
4. Chapter 4: Statistical Analysis & Findings discussion	48
4.1. Introduction.....	49
4.2. Sample profile (descriptive statistics for research sample).....	49
4.3. Validity & reliability tests for the questionnaires.....	53
4.4. Descriptive statistics for research variables (answer research questions).....	57
4.5. Testing Hypotheses & Findings Discussion	60
4.6. Conclusion	62
5. Chapter five: Research limitations, Recommendations & Conclusion	63
5.1. Research Limitations & Future Research	64
5.2. Research Recommendations	64
References	65
Appendix	68

List of Figures:

List of Tables:

1. Chapter 1: Introduction

1.1. Research Background

Our lives are always constantly shaped by projects, from minor details like cooking a meal, all the way to building bridges and developing software to organizing events and launching campaigns. These aims and efforts, ranging in complexity and size, have one common thread: **Project management**. Project management is a series of structured tasks, activities and deliverables that are carefully executed to achieve a desired outcome. They are temporary efforts to create value through unique products, services and processes (Project Management Institute, 2021. *Guide to the Project Management Body of Knowledge PMBOK guide – seventh Edition*). A **Project** has a distinct, clear start to finish points, defined objectives, and it makes use of numerous resources to achieve them. Whether it is the construction of a building or organizing a gathering, projects are a part of every aspect of our lives.

Nowadays, projects are complex and demand seamless synergy and coordination across the various elements of it, to reach the ideal quality for them. This is where integration management comes in; **integration management** the coordinated process and activities that unify the various elements of a project to achieve defined objective (Project Management Institute, 2021). It unifies the projects components and stakeholders, and adds to their significance. Projects can decrease errors, navigate challenges and provide high quality results. The full scope of how integration management impacts the projects quality is still a subject of constant, ongoing and continuous exploration, despite its recognized importance. Seamlessness in integration management is better for projects, as it delivers better and higher quality. There is a set of processes and activities that ensure the following:

- **Unified goals and objectives:** all project components contribute towards a single, shared vision (Project Management Institute. 2021).
- **Smooth information flow:** timely and accurate information exchange across teams and stakeholders (Baccarini, D. 2004).
- **Coordinated activities:** interdependencies between tasks are managed effectively, avoiding conflicts and delays (demirkesen, S., Ozorhon, B. 2017).

- **Effective change management:** adjustments are incorporated smoothly without derailing the project (PMI institute. 2021).
- **Resource optimization:** people, equipment, and materials are employed strategically for maximum impact (Project Management Institute. 2021).

As for **Project quality**, with the competitive markets and industries in the recent years, simply finishing projects on time and within budget is no longer enough. **Project quality** has become a great importance differentiator, determining not only the success of individual projects but also the reputation and competitiveness of organizations. Project quality surpasses simple product or service quality. It encompasses a broader spectrum of meeting and exceeding the expectations of stakeholders involved in a project. It translates into various dimensions, including:

- **Performance:** does the project deliver its intended functionality, features, and benefits as planned?
- **Conformance:** does it adhere to agreed-upon specifications, standards, and requirements?
- **Reliability:** does it operate consistently and avoid unexpected failures or errors?
- **Durability:** can it withstand anticipated use and remain effective over time?
- **Usability:** is it easy to use, understand, and maintain for its intended users?
- **Safety:** does it minimize risks and hazards to people and the environment?
- **Customer satisfaction:** does it meet the needs and expectations of clients or end-users?

(Project Management Institute, 2021. Guide to the Project Management Body of Knowledge PMBOK Guide – Seventh Edition).

While there is literature that provides beneficial observations and understanding of integration management and its practices, there are some deficiencies that need to be pointed out, which are the following points:

- Limited understanding of casual mechanisms.
- Lack of comprehensive models.
- Boundary conditions and contingency factors.

(Demirkesen, S., & Ozorhon, B. 2017). (Baccarini, D. 2004). (Cleland, D. I. 2007).

There are also some practical limitations that can be found, which are:

- Measurement challenges.
- Implementation challenges.
- Tailoring integration practices.
- Tailoring integration practices.
- Skills and training gaps.

(Project Management Institute 2022). (Morris, P. W. G., & Hough, G. H. 2007). (International Institute of Project Management. 2017).

With that being said, integration management can be used to elevate and enhance Project quality, ensuring that it smoothly gets developed into the best quality possible within the given conditions, resources, time, and budget.

Qatar's technology sector is rapidly growing and becoming increasingly important to the country's economy. The government has made significant investments in technology infrastructure and has launched multiple initiatives to promote innovation and entrepreneurship. As a result, Qatar now is a home to a thriving tech scene with a number of startups and established companies developing cutting-edge solutions. It's also experiencing a dynamic transformation, putting itself as a leader in innovation and digitalization. Qatar has been impressive in the recent years with their technology development. (Qatar Development Bank QDB). (Eltahir, N. B., & Mohamed, Z. 2020). (Al-mulla, S., & kathawala, J. 2019). (Sabagh, Z., & El-masri, R. 2022).

In this work, the main objective is to show the importance of integration management and its effects on the projects quality, specifically in the technology sector. There will be examples and

statistics on the technology sector in Qatar, in particular. The researcher here will delve into the details and information regarding all aspects mentioned above, projects, projects management, integration management, projects quality, and the technology sector in Qatar. This will also include quantitative information. This research is also aimed at project managers and whoever requires the given information within it.

1.2. Research Problem

While there are researches that acknowledge the link and connection between integration management and the project's success, a deeper and greater understanding of its specific impact on quality is required.

Imagine a building project where blueprints haven't been shared with construction crews, materials haven't been ordered on time, and budget changes haven't been communicated. That leads to chaos, delays, and cost overruns to overflow. Effective integration management prevents such scenarios by doing the following:

- **Improving project performance:** delivering projects on time, within budget, and to spend quality standards. (Project Management Institute, 2021. Guide to the Project Management Body of Knowledge PMBOK Guide) (Demirkesen, S., & Ozrorhon, B. 2017. Impact of integration management on construction project management performance).
- **Enhancing communication and collaboration:** fostering seamless teamwork and reducing silos. (Baccarini, D. 2004. The integration of design, procurement and construction: a study of leading UK contractors). (Morris, P . W. G., & Hough, G. H. 2007. The management of projects).
- **Minimizing risks and surprises:** proactively identifying and addressing potential issues early on. (Project Management Institute, 2022. Practice standard for risk Management – third edition). (Kerzner, H. B. 2017. Project management: a system approach to planning, scheduling, and controlling).
- **Increasing stakeholder satisfaction:** delivering results that meet expectations and build trust. (Cleland, D. I. 2007. Project management: strategic dimensions). (PMI institute. 2020. Guide to the Project Management Institute Body of Knowledge PMBOK guide – sixth edition).

1.2.1. Theoretical Gaps

- **Limited understanding of causal mechanisms:** While research shows a correlation, we don't fully understand **how** different integration practices (e.g., scope management, risk management) directly impact specific quality dimensions (e.g., performance, conformance). More research is needed to delve deeper into the specific mechanisms at play.
- **Lack of comprehensive models:** Existing models of integration management and project quality may not capture the **complexity** of real-world projects. New models are needed that account for dynamic and multifaceted environments, project lifecycle stages, and the interplay between different quality dimensions.
- **Boundary conditions and contingency factors:** The effectiveness of integration management for quality improvement may vary depending on project type, size, industry, and other factors. More research is needed to identify these **boundary conditions** and **contingency factors** that moderate the relationship between integration practices and quality outcomes.

1.2.2. Practical Gaps

- **Measurement challenges:** Measuring project quality remains a subjective and multifaceted endeavor. More robust and objective **quality measurement tools** are needed, incorporating both qualitative and quantitative dimensions aligned with project goals and stakeholder expectations.
- **Implementation challenges:** Implementing effective integration management often requires overcoming **organizational silos** and communication barriers. Further research is needed on practical strategies for breaking down these silos, fostering collaboration, and ensuring seamless information flow across project teams and departments.
- **Tailoring integration practices:** One-size-fits-all approaches may not be optimal. Research is needed on how to **tailor and adapt integration practices** based on

specific project characteristics, resource constraints, and organizational cultures.

- **Skills and training gaps:** Many project professionals lack the necessary skills and knowledge to effectively implement integration management practices. Research is needed to identify these **skill gaps** and develop targeted training programs to equip professionals with the skills needed to improve project quality through integration.

This research aims and seeks to address the following question:

- How do the different components and parts of integration management (e.g., scope integration, change management.etc) individually and collectively effect the projects quality?

1.3. Research Significance

As mentioned above, integration management plays a crucial role in achieving high-quality projects. In this research area, significant theoretical and practical importance's are held, impacting multiple stake holders and contributing to various fields of study

1.3.1. At the theoretical level

- **Understanding the mechanisms:** research helps delve into the specific mechanisms through which integration management practices influence project quality. This enhances our theoretical understanding of projects success factors and provides a foundation for further improvement. (Project Management Institute, 2021. Guide to the Project Management Body of Knowledge PMBOK guide – Seventh edition).
- **Developing new models and frameworks:** studies can evaluate existing models and propose new frameworks that include various integration management elements and their impact on quality dimensions. This leads to more comprehensive, understandable, and tailored approaches for different project types and contexts. (Morris, P . W . G., & Hough, G. H. 2007. The management of projects).
- **Examining boundary conditions:** research can test the effectiveness of integration management in diverse and various project settings, identifying potential limitations or boundary conditions where its impact may vary. This refines our understanding of where and how to best utilize these practices. (Cleland, D. I. 2007. Project management: strategic dimensions).

1.3.2. At the practical level

- **Improving project outcomes:** by understanding the link between integration management and quality, organizations can implement targeted practices to deliver projects that meet the desired criteria, leading to increased success and cost savings.

(Demirkesen, S., & Ozorhon, B. 2017. Impact of integration management on construction project management).

- **Enhancing decision-making:** research findings can confirm evidence-based decisions during project planning and execution, enabling organizations to prioritize and allocate resources effectively for quality achievement. (Baccarini, D. 2004. The integration of design, procurement and construction: a study of leading UK contractors).
- **Advancing professional practice:** sharing research and best practices through publications, conferences, and training programs improves the competence and knowledge of project management professionals, leading to higher quality outcomes across industries. (Project Management Institute, 2022. Practice standard for Risk Management – Third edition.)

1.4. Research Questions

- ✓ How does scope integration affect the projects quality?
- ✓ How does the change management affect the quality of the project?
- ✓ What type of integration management strategies can we use to have better project quality?
- ✓ What are the limitations of traditional integration management approaches in achieving high quality in projects?
- ✓ Are there specific project characteristics or industry context where the impact of integration management on quality is more notable and prominent?
- ✓ Can we pinpoint the best practices and strategies for implementing integration management to guarantee consistent quality improvement across diverse and different projects?

1.5. Research Objectives

1.4.1. The main objective

- Investigate the relationship between effective integration management practices and project quality outcomes.

1.5.2. The sub-objectives

1. Identify the specific mechanisms by which integration management contributes to improved quality.
2. Develop a framework or model that explains how integration management practices influence different quality dimensions.
3. Analyze the impact of various integration management practices (e.g., scope management, risk management, communication management) on project quality metrics.
4. Compare and contrast the effectiveness of integration management practices for quality improvement across different industries and project types.

1.6. Research Hypotheses

1.6.1. The main hypotheses H1:

- There is a positive correlation between the effectiveness of integration management and overall project quality.

1.6.2. The first sub-hypotheses Ha:

- Projects with higher levels of integration management practices will experience fewer defects and rework compared to projects with lower levels of integration.

1.6.3. The second sub-hypotheses Hb:

- Effective integration management will lead to increased stakeholder satisfaction with project quality.

1.6.4. The third sub-hypotheses Hc:

- Implementing a centralized communication platform will improve collaboration and information flow, leading to enhanced quality outcomes.

1.6.5. The fourth sub-hypotheses Hd:

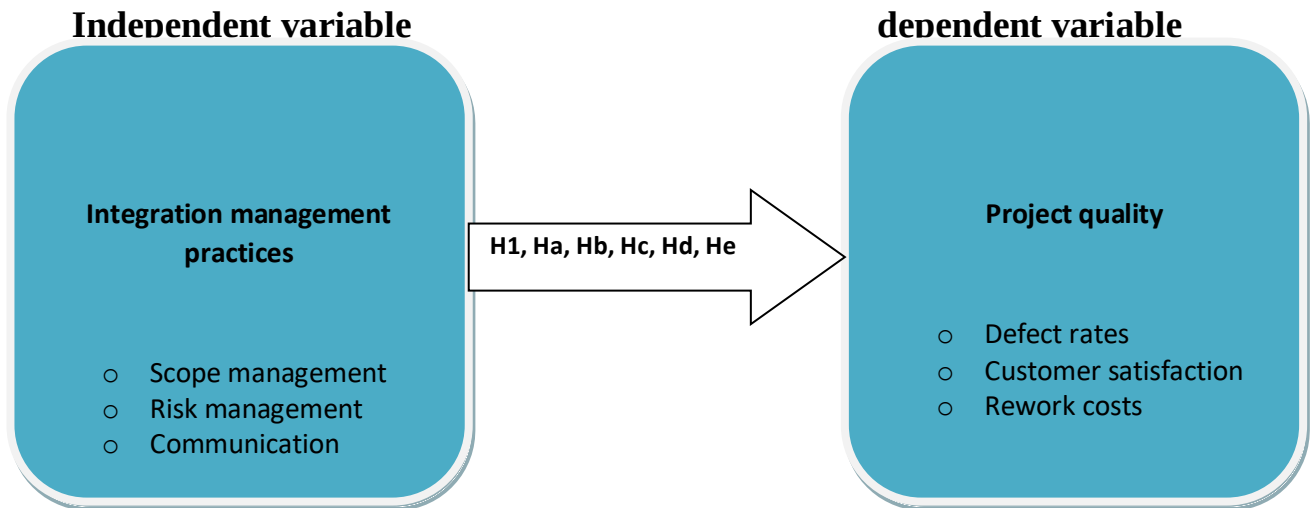
- Proactive risk management practices integrated throughout the project lifecycle will result in a reduction of quality-related risks and improved defect prevention.

1.6.6. The fifth sub-hypotheses He:

- Early and continuous stakeholder engagement through integration management will contribute to a better understanding of quality expectations and improve the likelihood of achieving them.

1.7. Research Model

Designed by researcher



1.8. Scope of the Study

Qatar is experiencing a dynamic transformation in the Technology sector, placing itself as a leader in innovation and digitalization. It's actively working towards developing and promoting technology in various sectors as part of Qatar National Vision 2030 (Qatar Development Bank QDB). Technology plays a key role in Qatar's new economic ambitions. The country is increasingly seeking to develop a knowledge-based economy, with new technologies at its core. It has set specific targets when it comes to training Qatari nationals and equipping its workforce to prepare for both the challenges and opportunities of the future. Similar to many fast-growing economies across the world, a complete comprehensive digital transformation will be primary to Qatar's future development (World Finance website).

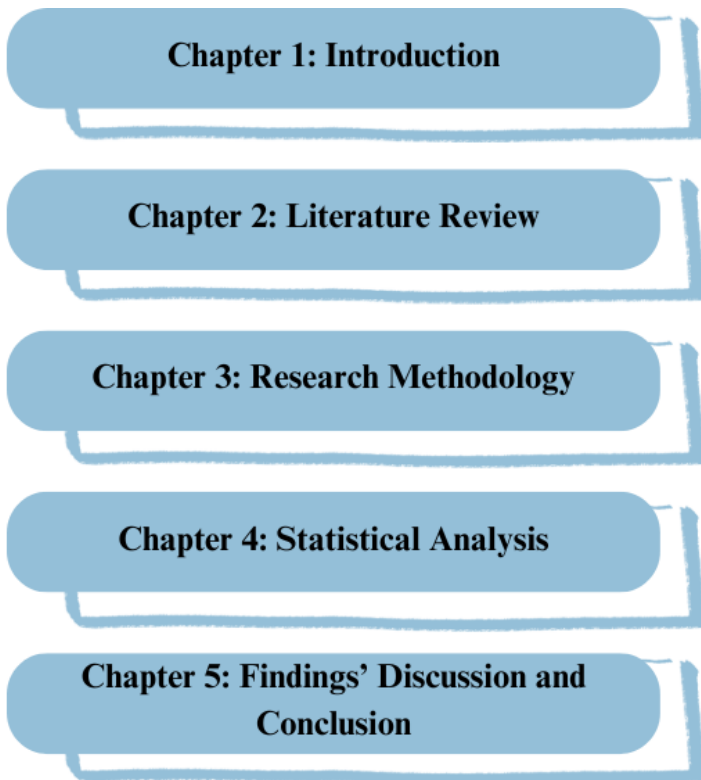
Qatar's technology transformation is well ongoing, and businesses need to make sure that they don't get left behind as the nation chases a digitally driven future. By embracing a number of emerging technologies such as Artificial Intelligence, data analytics and robotics, companies can enjoy enhanced efficiency and productivity, which leads to reducing costs and improving communication services, among other benefits (World Finance website).

A few examples for some of the technology companies and firms: Vodafone Qatar, Ooredoo Qatar, MEEZA, Qatar National Bank, Mannai Corporation.

With the growing number of projects within the technology sector in Qatar, the researcher is hoping to highlight the importance of using integration management to improve the quality of projects, by applying the right methods and steps with this research.

1.9. The Project Structure

The research will be conducted in distinct phases, encompassing literature review, data collection, data analysis, and interpretation of findings. The projects overall structure is like the following:



Designed by researcher

2.Chapter 2: Literature Review

2.1. Introduction

This literature review aims to build upon existing knowledge by exploring the intricate relationship between integration management and the projects quality. By critically analyzing research findings and identifying gaps in the present understanding, this review seeks to contribute to a more comprehensive understanding of how integration management practices can be optimized to ensure consistent delivery of high-quality projects.

Project success hinges on achieving not only objectives within the budget and time constraints, but also on delivering high-quality outcomes. Integration management, the practice of coordinating the various project activities and ensuring their seamless interaction, plays a critical role in this pursuit (Project Management Institute, 2021). This literature review delves into the existing body of research to explore the impact of integration management practices on projects quality.

Several studies highlight a positive correlation between effective integration management and improved project quality. Demriksen and ozorhon (2017) found a statistically significant link between strong integration management practices and fewer defects, rework, and delays related to quality issues in construction projects. Similarly, Khan and Ahmed (2017) demonstrated that effective integration management practices positively influence software project performance, a key indicator of quality. These findings suggest that integration management acts as a catalyst for achieving high- quality project outcomes across various industries.

However, the relationship between integration management and project quality might not be straightforward. A growing body of research suggests the presence of moderating factors. Love and Li (2000) emphasize the importance of process integration in construction supply chains for quality improvement. Zou et al. (2007) further points this by highlighting the need for an integrated framework specifically tailored to the Chinese construction project management context. These studies point out that the effectiveness of integration management for quality improvement can be influenced by the projects characteristics and industry- specific factors.

Furthermore, scholars like Garvin (1987) propose frameworks outlining the various dimensions of quality (e.g., performance, conformance). While some studies, like Khan and Ahmed (2017), focus on overall project performance as a quality indicator, others might delve deeper into specific quality dimensions. Understanding the impact of integration management on different aspects of quality requires further investigation.

2.2. The independent variable

2.2.1. Integration Management:

Integration management, as defined by the Project management institute (PMI) in the Guide to the Project Management Body of Knowledge (PMBOK Guide) – Seventh Edition (2021), is “the process of coordinating all the project processes and ensuring their integrated functioning” (p. 140). It acts as the glue that binds various project management processes together, ensuring seamless information flow, aligned efforts, and minimized risk of conflicts or inconsistencies. This literature review explores the key practices encompassed within integration management and their potential impact on the projects outcomes.

2.2.2. Core Practices of Integration Management:

Several core practices add up to effective integration management. These include:

- **Project management plan development:** This involves creating a comprehensive document that outlines the projects scope, schedule, budget, resources, communication plan, risk management plan, and other critical elements (Project Management Institute, 2021). It serves as a central reference point and ensures

integration across all the project activities.

- **Integrated change control:** Managing changes effectively is crucial for maintaining project integrity. Integration management facilitates a systematic review process for proposed changes, analyzing their impact on various project aspects and ensuring necessary adjustments are made across the board (Morris & Pinto, 2020).
- **Stakeholder Management:** Effective stakeholder engagement throughout the project lifecycle is paramount. Integration management practices ensure that all stakeholders are identified, their needs and expectations are understood, and communication channels are established to keep them informed and involved (Freeman, 2010).
- **Issue Management:** Issues or potential problems can arise throughout a project. Integration management facilitates a structured approach to identifying, analyzing, resolving, and preventing issues. This ensures timely action and minimizes negative impacts on project goals (Cleland, 2017).

2.2.3. Impact on Project outcomes:

Research suggests that effective integration management can significantly impact project outcomes in various ways:

- **Improved Project Quality:** Studies by Demriksen and ozorhon (2017) and Khan and Ahmed (2017) demonstrate a positive correlation between strong integration practices and fewer defects, rework, and delays related to quality issues. This is attributed to enhanced collaboration, proactive risk management, and better communication.
- **Enhanced Project Performance:** Integration management can lead to improved project performance indicators like timeliness, budget adherence, and scope completion. By ensuring alignment across project processes, it avoids delays caused by inconsistencies and facilitates resource optimization (Morris & Pinto, 2020).
- **Increased Project Success Rates:** effective integration management practices can contribute to a higher probability of achieving project objectives. A study by Baccarini (1999) found a strong correlation between integration management maturity and project success, highlighting its significance.

2.2.4. Challenges and Considerations:

Despite the benefits of it, implementing effective integration management presents and displays certain challenges.

- **Complexity of Projects:** The complexity of a project can significantly influence the integration management approach. Projects with numerous stakeholders, intricate dependencies, or high levels of uncertainty might require more sophisticated integration techniques (Zou et al., 2007).
- **Organizational Culture:** Organizational culture plays an extremely important role. Integration management thrives in environments that encourage collaboration, information sharing, and a focus on projects success over individual goals (Zwek et al., 2018).
- **Technological Support:** Technology can significantly enhance integration management by facilitating information flow and collaboration. Utilizing project management software, communication platforms, and data analytics tools can streamline integration efforts (PMI, 2021).

2.3. The dependent variable

2.3. Project Quality:

Project quality is a multifaceted concept that encompasses various aspects of how well a project meets its intended objectives. It goes beyond simply delivering on time and within the budget. This literature review explores the different dimensions of project quality and highlights research on factors influencing project quality outcomes.

2.3.1. Understanding Project Quality:

Garvin (1987) proposes eight key dimensions of quality applicable to various project contexts:

- **Performance:** The project's ability to meet its functional and operational requirements. This quality dimension focuses on features that can be easily measured. Brands can be compared and ranked based on these individual aspects of how well they perform. However, creating an overall ranking of performance can be trickier, especially when some features might not be important for every customer.
- **Conformance:** The degree to which the project adheres to specifications and standards. While defect rates and service calls are common ways to measure how well a product meets standards, they have limitations. These measures focus on issues requiring repair or service, but they miss other problems like misspellings on labels or poor construction quality that might not necessitate a service call.
- **Features:** The presence of desired functionalities and features that enhance project value. Essential to a feature's value proposition is its foundation in objectively measurable attributes. While individual needs undoubtedly influence the perceived quality of a feature, it's the inherent, unbiased characteristics that ultimately determine its contribution to overall product quality.
- **Reliability:** The consistency and dependability of the project's deliverables. When assessing a product's reliability, three key metrics are commonly employed: mean time to first failure (MTTF), mean time between failures (MTBF), and failure rate. MTTF and MTBF provide average timeframes, indicating how long a product typically functions before its first failure and between subsequent failures, respectively. The failure rate complements these by expressing the frequency of failures per unit of time.
- **Durability:** The project's lifespan and ability to withstand wear and tear over time. Durability encompasses two key aspects of a project's lifespan. Firstly, it refers to the overall amount of use a project can withstand before it experiences significant deterioration in its functionality or performance. Secondly, it reflects the point at which continued maintenance or upgrades become less practical compared to starting a new project entirely.

- **Perceived Quality:** Project stakeholders often lack complete information about a project's long-term performance or sustainability. Therefore, they rely on indirect measures to assess and compare project delivery teams. For instance, a project's durability, the ability to withstand future challenges and remain relevant, is rarely directly observable. Stakeholders must infer this quality by evaluating various tangible and intangible aspects of the project and the project team.
- **Serviceability:** The effort required to maintain, repair, or upgrade the projects deliverables. Beyond simply delivering a project, stakeholders are deeply invested in several factors that influence their ultimate evaluation of project success. This extends beyond completion and encompasses the ongoing functionality and performance of the project. Key areas of concern include **downtime**, the duration it takes to resolve disruptions or issues that hinder project effectiveness. Stakeholders also value **responsiveness**, the timeliness with which project teams address and schedule interventions to tackle these issues. The quality of communication and collaboration between stakeholders and the project team throughout the resolution process, characterized by **team interactions**, significantly impacts perceptions of project quality. Ultimately, the **resolution effectiveness**, the success rate of interventions in permanently addressing the identified problems, plays a crucial role. Furthermore, even in situations where initial interventions are unsuccessful, a project's **complaint handling** procedures, the efficiency and effectiveness of addressing stakeholder concerns raised through normal channels, can significantly influence their overall assessment. These factors, encompassing post-delivery support and responsiveness to issues, are fundamental in shaping stakeholders' perception of project quality and the ultimate success of the project itself.
- **Aesthetics:** The projects visual appeal and overall user experience. Aesthetics is a subjective dimension of project quality. The visual appeal, user experience, and overall sensory impression a project evokes are matters of personal taste and cultural context. Achieving universal satisfaction on this dimension can be challenging.

2.3.2. Factors affecting Project Quality:

Research suggests that several factors influence project quality outcomes.

Here are some key areas:

- **Project Management Practices:** Studies by Baccarini (1999) and Demirkesen and Ozorhon (2017) highlight the critical role of effective project management practices, particularly integration management, in achieving high-quality project outcomes. These practices ensure smooth collaboration, risk mitigation, and timely issue resolution, leading to better quality deliverables.
- **Project Team Capabilities:** A project team with the necessary skills, experience, and knowledge is essential for achieving quality. Inadequate expertise can lead to design flaws, implementation errors, and ultimately, a decline in project quality (Cleland, 2017).
- **Stakeholder Management:** Proactive stakeholder engagement throughout the project lifecycle is crucial. Ignoring stakeholder expectations and needs can lead to dissatisfaction and potentially rework, impacting quality (Freeman, 2010).
- **Communication and Information Sharing:** Open communication and information sharing are critical for ensuring everyone involved in the project has the latest updates and a clear understanding of quality expectations. Research by Zweck et al. (2018) emphasizes that a culture of transparency fosters quality improvement.

2.3.3. Measuring Project Quality:

Evaluating project quality is multifaceted, as mentioned above. Metrics used can be quantitative, focusing on aspects like defect rates or rework costs, or qualitative, addressing stakeholder satisfaction and user experience. Choosing appropriate metrics depends on the specific project and its quality objectives.

Projects success hinges on delivering not only on time and within budget, but also on achieving high-quality outcomes. Integration management, the practice of coordinating various project

activities and ensuring their seamless interaction, plays a critical role in this pursuit. This section of the literature review delves into the existing body of research to explore the intricate relationship between integration management practices and project quality.

2.4. The relationship between the independent and the dependent variables

2.4.1. Positive Impact on Quality:

Numerous studies highlight a positive correlation between effective integration management and improved project quality. Here are some key findings:

- **Reduced Defects and Rework:** Demirkesen and Ozorhon (2017) found a statistically significant link between strong integration practices and fewer defects, rework, and delays related to quality issues in construction projects. This highlights the importance of coordination for minimizing errors and ensuring quality throughout the lifecycle.
- **Enhanced Performance:** Khan and Ahmed (2017) demonstrated that effective integration management practices positively influence software project performance, a key indicator of quality. This suggests that integrated planning, risk management, and communication lead to more efficient project execution and ultimately, higher quality deliverables.
- **Increased Stakeholder Satisfaction:** By fostering collaboration and information sharing, integration management facilitates proactive stakeholder engagement. Baccarini (1999) found a strong correlation between integration management maturity and project success, which often includes stakeholder satisfaction as a key metric.

2.4.2. Underlying Mechanisms:

Research suggests that various mechanisms underpin the positive impact of integration management on project quality:

- **Improved Communication and Collaboration:** Integration management practices facilitate clear communication channels and collaboration between project team members and stakeholders. This ensures everyone has access to the latest information and aligns their efforts towards achieving common quality goals (Zweck et al., 2018).
- **Proactive Risk Management:** Integrated risk management, a core practice of integration management, promotes early identification and mitigation of potential risks that could negatively impact quality. By proactively addressing risks, project teams can prevent rework and ensure deliverables meet quality expectations (Cleland, 2017).
- **Optimized Resource Allocation:** Integration management practices help ensure resources are allocated efficiently across project activities. This allows project teams to focus on quality-related tasks and avoid resource constraints that might compromise quality outcomes (Project Management Institute, 2021).

2.4.3. Moderating Factors:

The effectiveness of integration management for quality improvement can be influenced by several factors:

- **Project Characteristics:** Love and Li (2000) emphasize the importance of process integration in construction supply chains for quality improvement. Zou et al. (2007) highlight the need for tailored integration management frameworks for specific industry contexts. Project complexity, dependencies, and uncertainty levels can necessitate adjustments in integration approaches to optimize their impact on quality.
- **Organizational Culture:** Organizational culture plays a crucial role. Integration management thrives in environments that promote collaboration, information sharing, and a focus on project success over individual goals (Freeman, 2010). A culture that emphasizes quality will be more receptive to the benefits of effective integration practices.

- **Technological Support:** Technology can significantly enhance integration management by facilitating information flow and collaboration. Utilizing project management software, communication platforms, and data analytics tools can streamline integration efforts and support quality improvement initiatives (PMI, 2021).

2.4.4. Research Gaps and Future Directions:

While research highlights the positive influence of integration management on project quality, there are several gaps that remain:

- **Specific Quality Dimensions:** While some studies focus on overall performance as a quality indicator, future research could delve deeper into the impact of integration management on specific quality dimensions as outlined by Garvin (1987), such as usability or serviceability.
- **Industry-Specific Investigations:** Further research exploring the implementation and effectiveness of integration management in diverse industries can provide valuable insights into adapting practices to achieve optimal quality outcomes in specific contexts.
- **Longitudinal Studies:** Longitudinal studies that track the impact of integration management on quality throughout the project lifecycle can offer a more comprehensive understanding of its evolving influence.

2.5. Conclusion

2.5.1. The Cornerstones of Project Success: Integration Management, Quality, and Technology

Successful project delivery relies on a strong foundation built upon three pillars: effective integration management, a relentless pursuit of high-quality project outcomes, and the strategic utilization of technology. Integration management practices, like project planning and risk management, foster collaboration, resource optimization, and proactive problem-solving – all vital for quality project execution. Research affirms this positive influence across industries. However, project complexity, organizational culture, and technological support can affect its effectiveness.

Project quality, much like integration management, demands a multi-faceted approach. A clear understanding of quality dimensions and influencing factors empowers project managers to implement strategies that enhance quality throughout the project lifecycle. Effective project management, skilled teams, proactive stakeholder engagement, and open communication are all crucial contributors.

This cohesive conclusion highlights the synergy between integration management and project quality. It emphasizes the importance of both aspects for successful project delivery and identifies areas for further research.

2.5.2. Technology as a Catalyst for Excellence in Qatar

Qatar's technology sector, fuelled by government initiatives and a commitment to innovation, presents a powerful opportunity to enhance both integration management and project quality. Technologies like information and communication technologies (ICT), FinTech, and Artificial Intelligence (AI) can streamline communication, optimize resource allocation, and provide advanced tools for risk mitigation. By fostering a culture of continuous improvement and adaptation, Qatar can leverage its technological advancements to solidify its position as a regional leader in project delivery excellence.

2.5.3. The Road Ahead: Continuous Improvement and Research

Further research exploring moderating factors, specific quality dimensions, and industry-specific applications can refine how integration management and technology are leveraged for continuous quality improvement across diverse project contexts. Additionally, addressing challenges related to human capital development, nurturing start-ups, and cyber security will be crucial for sustained growth and solidifying Qatar's position as a regional technology hub.

3. Chapter 3: Research Methodology

3.1. Introduction

This chapter outlines the research methodology employed to investigate the relationship between project integration management practices and project quality within the technology sector of Qatar. It details the operational definitions of key research variables, the chosen research design, the target population and sampling methods, data collection techniques, the types of data gathered, and the methods and procedures used for data analysis.

3.2. Operational definitions for research variables

In research studies, operational definitions are crucial for clearly defining the variables being measured. These definitions specify how a variable will be measured, observed, or manipulated. They ensure consistency, reliability, and validity within the research.

Operational Definitions of Research Variables

This section defines the key research variables used in this study:

- **Project Integration Management:** This variable will be operationalized by assessing the effectiveness of practices related to the five core processes of project integration management as outlined by the Project Management Institute (PMI):
 - **Project Planning and Initiation:** The extent to which project scope, objectives, deliverables, and timelines are clearly defined and documented during the planning stages. This will be measured through a survey instrument that asks participants to rate the level of detail and clarity in project plans and the effectiveness of the planning process.
 - **Project Execution and Monitoring:** The efficiency and effectiveness of executing project activities according to the plan and actively monitoring progress against established baselines (schedule and budget). This will be assessed through survey questions regarding the frequency of performance reviews, adherence to project schedules, and the use of project management tools for monitoring progress.

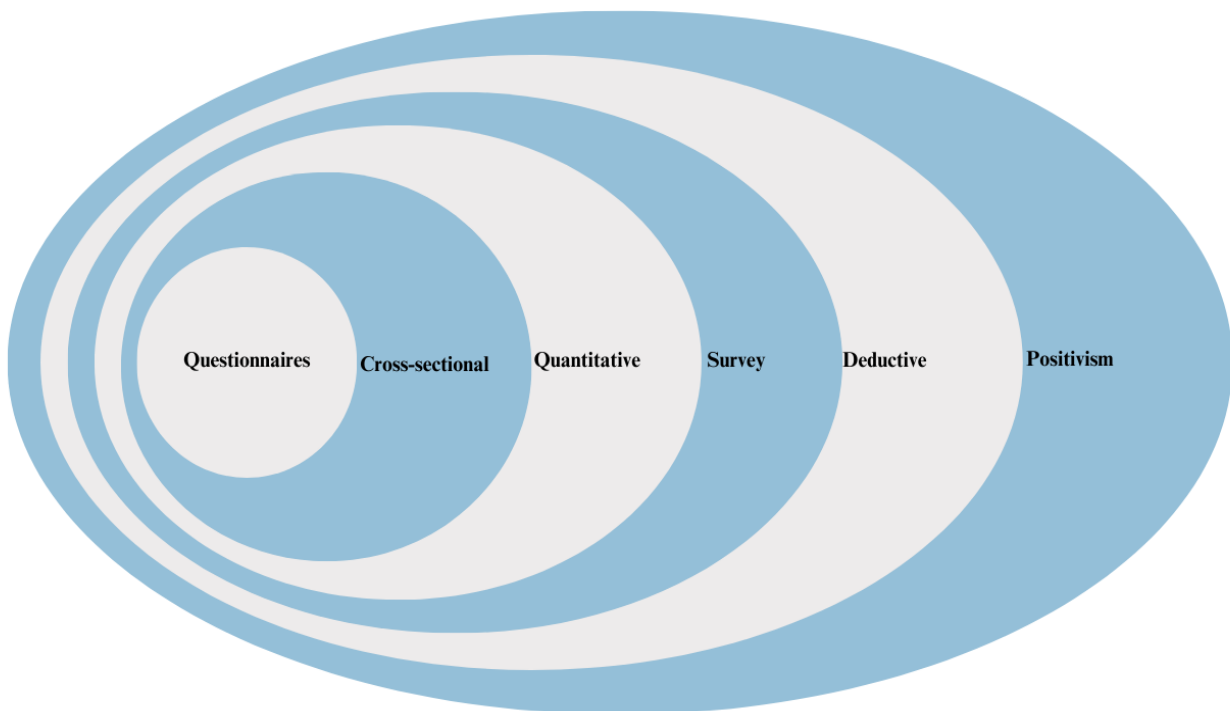
- **Change Control:** The effectiveness of the process for managing changes to project scope or requirements. This will be measured by questions about the formalization of a change control process, the ease of submitting change requests, and the timeliness of evaluating and integrating approved changes into the project plan.
- **Project Monitoring and Control:** The methods and procedures used to track progress, identify and address risks, and implement corrective actions when necessary. Survey questions will address the use of risk management strategies, the frequency of issue identification and resolution, and the effectiveness of communication during project execution.
- **Project Closure:** The existence and effectiveness of a formal process for project closure, including documenting lessons learned. This will be measured by questions regarding the presence of a closure checklist, the level of detail in project closure documentation, and the frequency of incorporating lessons learned into future projects.
- **Project Quality:** This variable will be operationalized by focusing on **productivity levels** achieved within projects. A survey will be used to gather data on metrics such as:
 - **Project completion rate on time and within budget:** This provides a direct measure of project efficiency and adherence to planned schedules and costs.
 - **Rework rates:** The frequency of rework due to errors or missed requirements indicates a lack of quality in planning or execution.
 - **Resource utilization:** The efficiency of resource allocation and utilization throughout the project lifecycle.

By using these operational definitions, we can investigate the relationship between effective project integration management practices (independent variable) and project quality as measured by productivity levels (dependent variable).

This approach allows us to explore whether well-integrated project management leads to more efficient and timely project completion, reduced rework, and optimal resource utilization, ultimately impacting overall project quality.

3.3. Research design (research onion)

- **Research philosophy:** Positivism
- **Research approach:** Deductive
- **Research strategy:** Survey
- **Research choice:** Quantitative
- **Time horizon:** Cross-sectional
- **Data collection and analysis technique:** Questionnaires



Designed by researcher

3.4. Research population & Sampling methods and technique

Research population: To investigate the relationship between project integration management and project quality within the technology sector, this study focuses on a specific population and sample:

- **Population:** All project management professionals working within technology companies in Qatar.
- **Sample:** A representative sample of project managers from various technology companies in Qatar will be selected through **Convenience Sampling** random sampling based on company size. This sample size will be around 30 to 50 answers to ensure sufficient data for analysis while maintaining manageable survey administration.

Sector	Classification	Number of employees
The technology sector	All employees working within the sector	About 22,600 employees. <i>The entrepreneurship ecosystem in the ICT sector in Qatar: local advantages and constraints</i> Tarek Ben Hassen (Department of International Affairs, Qatar University, Doha, Qatar)

Made by the Researcher, 2024

Sampling method & technique: **Convenience Sampling** as a non-probability sampling technique and method.

The research sample	Sample
Target employees in the technology sector	30 to 50 employees

Made by the Researcher, 2024

3.5. Data collection method

This research will employ a survey instrument to gather data from project management professionals working within the technology sector of Qatar. A web-based survey platform Google Forms will be utilized to ensure accessibility and efficient data collection.

Survey Design

The survey will be designed to capture information on two key aspects:

- **Project Integration Management Practices:** Questions will assess the effectiveness of practices related to the five core processes of project integration management as outlined by the Project Management Institute (PMI). These processes include project planning and initiation, project execution and monitoring, change control, project monitoring and control, and project closure. The survey will utilize a combination of question formats, including Likert scales, multiple-choice questions, and open-ended questions to gather detailed data on the frequency and effectiveness of these practices within participating organizations.
- **Project Quality:** The survey will focus on measuring project quality through the lens of **productivity levels**. Questions will address metrics such as:
 - Project completion rate on time and within budget
 - Rework rates due to errors or missed requirements
 - Resource utilization throughout the project lifecycle

Sample Selection

A convenience sampling approach will be used to select a representative sample of project managers and other employees from various technology companies in Qatar. This will ensure

that the data collected reflects the experiences of a diverse range of professionals within the sector. The target sample size will be 30 to 50 answers to ensure sufficient data for analysis while maintaining manageable survey administration.

Data Collection Procedure

The survey will be pretested with a small group of project managers and other employees working in the technology sector to ensure clarity, comprehensiveness, and ease of use. Following any necessary revisions, the survey will be distributed electronically to the selected sample through email invitations with a link to the survey platform. Participation in the survey will be voluntary, and anonymity will be guaranteed to encourage honest responses.

3.5.1. **Independent variable Integration management** This research utilized a questionnaire adapted from Demirkesen & Ozorhon (2017) to measure the independent variable, project integration management. The questionnaire assessed various dimensions of this variable: **Project Planning and Initiation:** This dimension focused on the clarity and comprehensiveness of project planning activities, including defining scope, objectives, deliverables, and timelines. **Project Execution and Monitoring:** This dimension evaluated the efficiency and effectiveness of executing project activities according to the plan and actively monitoring progress against established baselines (schedule and budget). **Change Management:** This dimension assessed the effectiveness of the process for managing changes to project scope or requirements, focusing on aspects like formalization of the change control process, ease of submitting change requests, and timeliness of evaluating and integrating approved changes. **Project Monitoring and Control:** This dimension evaluated the methods and procedures used to track progress, identify and address risks, and implement corrective actions when necessary. The questionnaire might address the use of risk management strategies, the frequency of issue identification and resolution, and the effectiveness of communication during project execution. **Project Closure:** This dimension assessed the existence and effectiveness of a formal process for project closure, including documenting lessons learned. The questionnaire might address the presence of a closure checklist, the level of detail in project closure documentation, and the

frequency of incorporating lessons learned into future projects. **Success Criteria:** participant agreement with statements related to meeting project goals, delivering value, achieving stakeholder satisfaction. A Likert scale with five response options (Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree) was used to measure the participants' level of agreement with statements related to each dimension and element.

Variable	Dimensions	Number of items	Source
Integration management	Project Planning and Initiation	2	Demirkesen & Ozorhon (2017)
	Project Execution and Monitoring	2	
	Change Management	2	
	Project Monitoring and Control	2	
	Project Closure	2	
	Success Criteria	6	

Made by the Researcher, 2024

3.5.2. **Dependent variable Project Quality** to assess the dependent variable, project quality, this research relied on a questionnaire adapted from Arditi & Gunaydin (1999). The questionnaire focused on several key dimensions of project quality: **Defining Project Quality:** This dimension focuses on the participants' understanding and perception of what constitutes "quality" within the project context. The questionnaire might include questions about the importance of specific quality attributes (e.g., adherence to budget and schedule, meeting client requirements, achieving operational efficiency). **Quality Management Practices:** This dimension assesses the effectiveness of practices implemented to ensure project quality. The questionnaire could address areas like quality planning, defect prevention, control, and improvement processes within the project lifecycle. **Project**

Integration Management and Project Quality: This dimension explores the relationship between effective project integration practices (as measured in the previous section) and their impact on project quality. The questionnaire might ask participants to rate their agreement with statements about how well integrated project management contributes to achieving quality goals. **Factors Affecting Project Quality:** This dimension delves into the various internal and external factors that can influence project quality. The questionnaire could include questions related to factors like: **Project team competence:** The skills and experience of project personnel. **Stakeholder involvement:** The level of clear communication and collaboration with stakeholders throughout the project. **Project complexity:** The degree of difficulty and uncertainty associated with the project. **Resource availability:** Adequate allocation of resources (personnel, equipment, budget) to achieve quality outcomes. A Likert scale with five response options (Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree) was used to measure the participants' level of agreement with statements related to each dimension and elements.

Variable	Dimension	Number of items	Source
Project Quality	Defining Project Quality	2	Arditi & Gunaydin (1999).
	Quality Management Practices	2	
	Project Integration Management and Project Quality	2	
	Factors Affecting Project Quality	14	

Made by the Researcher, 2024

3.6. Types of data

This research will utilize a combination of primary and secondary data to investigate the relationship between project integration management and project quality within Qatar's technology sector.

Primary Data

The primary data for this study will be collected through a survey instrument distributed to project management professionals working in Qatari technology companies. The survey will be designed to capture information on the following aspects:

- **Project Integration Management Practices:** Questions will assess the effectiveness of practices related to the five core processes of project integration management as outlined by the Project Management Institute (PMI).
- **Project Quality:** The survey will focus on measuring project quality through the lens of **productivity levels**. Questions will address metrics such as:
 - Project completion rate on time and within budget
 - Rework rates due to errors or missed requirements
 - Resource utilization throughout the project lifecycle

Secondary Data

Secondary data will be used to supplement the primary data and provide additional context for the research. Potential sources of secondary data include:

- **Academic Journals and Research Reports:** Studies exploring project integration management, project quality, or their relationship within the technology sector can offer valuable insights and relevant theoretical frameworks.
- **Industry Reports:** Reports from government agencies, industry associations, or market research firms might provide data on project management practices, technology sector trends, or project success rates within Qatar.

- **Project Management Standards and Best Practices:** Resources from organizations like the Project Management Institute (PMI) can provide insights into recommended project integration management practices and their expected impact on project outcomes.

3.7. Statistical analysis procedures

Following data collection, a rigorous statistical analysis will be conducted using the Statistical Package for the Social Sciences (SPSS) version 28. This process aims to extract meaningful insights and test the research hypotheses.

The analysis will involve several key steps:

1. **Descriptive Statistics:** This initial step will provide a summary of the collected data, including measures of central tendency (mean, median) and dispersion (standard deviation, range) for various variables. Additionally, the analysis will explore the characteristics of the sample population through frequency tables and percentages to understand demographics, project management experience, and other relevant information.
2. **Validity and Reliability Testing:** Before proceeding with hypothesis testing, it's crucial to ensure the data's quality.
 - **Exploratory Factor Analysis (EFA):** This technique will be used to assess the construct validity of the survey instrument, determining if the questions effectively measure the intended project integration management and project quality dimensions.
 - **Cronbach's Alpha Test:** This will be employed to measure the internal consistency (reliability) of the scales used in the survey. A high Cronbach's Alpha coefficient indicates that the items within each scale are measuring the same underlying construct.

3. **Hypothesis Testing:** Once data quality is established, statistical tests will be conducted to examine the research hypotheses. The specific tests chosen will depend on the nature of the data and the research questions.
- For example, if the hypothesis investigates the relationship between project integration management practices and project productivity levels (measured as a continuous variable), tests like Pearson correlation analysis or regression analysis might be used.
 - If the hypothesis explores the association between project integration management practices and project success categorized as "successful" or "unsuccessful," Chi-Square tests might be appropriate.

Software Selection:

SPSS version 28 will be utilized for all statistical analyses due to its user-friendly interface and comprehensive suite of statistical procedures.

3.8. Conclusion

This section summarizes the research methodology employed to investigate the relationship between project integration management and project quality within Qatar's technology sector.

Data Collection

A survey instrument will be the primary source of data, distributed electronically to a representative sample of project management professionals working in Qatari technology companies. The chosen sampling method convenience sampling will ensure the sample reflects the sector's diverse range of professionals. The survey will be designed to capture information on project integration management practices (adapted from a source like Demirkesen & Ozorhon, 2017) and project quality measured through productivity levels (adapted from a source like Arditi & Gunaydin, 1999). Secondary data from academic journals, industry reports, and project management resources will supplement the primary data and provide additional context.

Data Analysis

The collected data will undergo a rigorous statistical analysis using SPSS version 22. Descriptive statistics will provide an initial overview of the data, and the characteristics of the sample population will be explored. Validity and reliability testing will be conducted utilizing Exploratory Factor Analysis (EFA) and Cronbach's Alpha to ensure the measurement instruments effectively capture the intended constructs. Finally, appropriate statistical tests will be employed to examine the research hypotheses, with the specific tests chosen based on the data type and research questions.

This comprehensive research methodology, combining a well-designed survey, representative sample, and robust statistical analysis, will provide valuable insights into the impact of project integration management practices on project quality within Qatar's technology sector. The findings of this research can contribute to improved project management practices, leading to higher productivity and overall project success in Qatar's technology industry.

4. Chapter 4: Statistical Analysis & Findings discussion

4.1. Introduction

This chapter presents the statistical analysis conducted on the data collected from the field study. Utilizing SPSS version 28, descriptive statistics were employed to characterize the study sample. To ensure data quality, the reliability and validity of the research instruments were assessed. Subsequently, simple linear regression analysis was performed using SPSS version 28 to examine the relationship between the variables and test the formulated hypotheses.

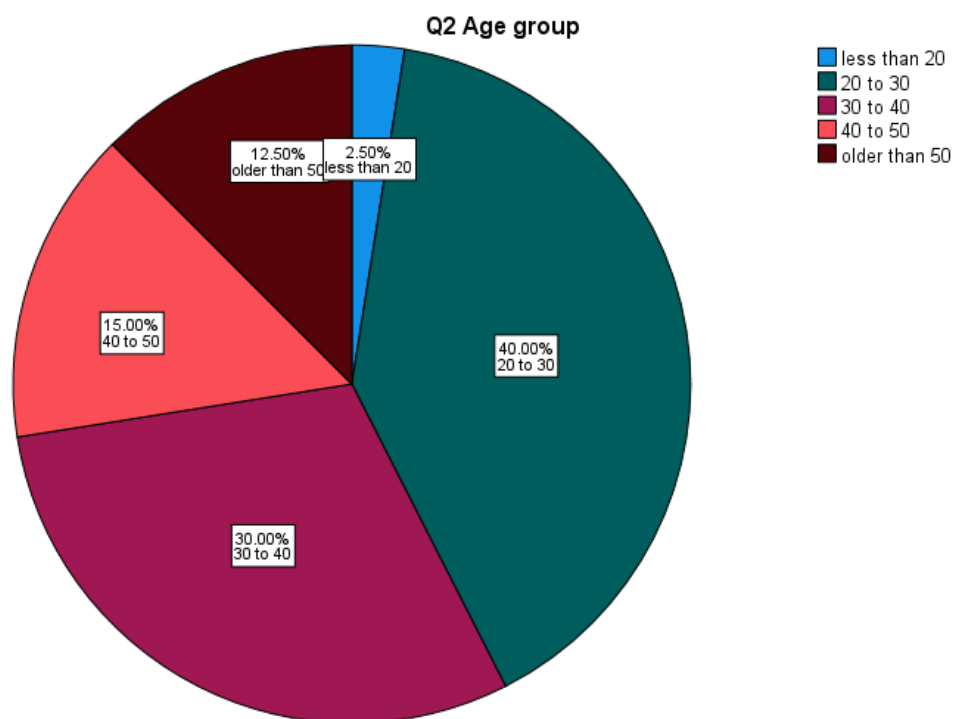
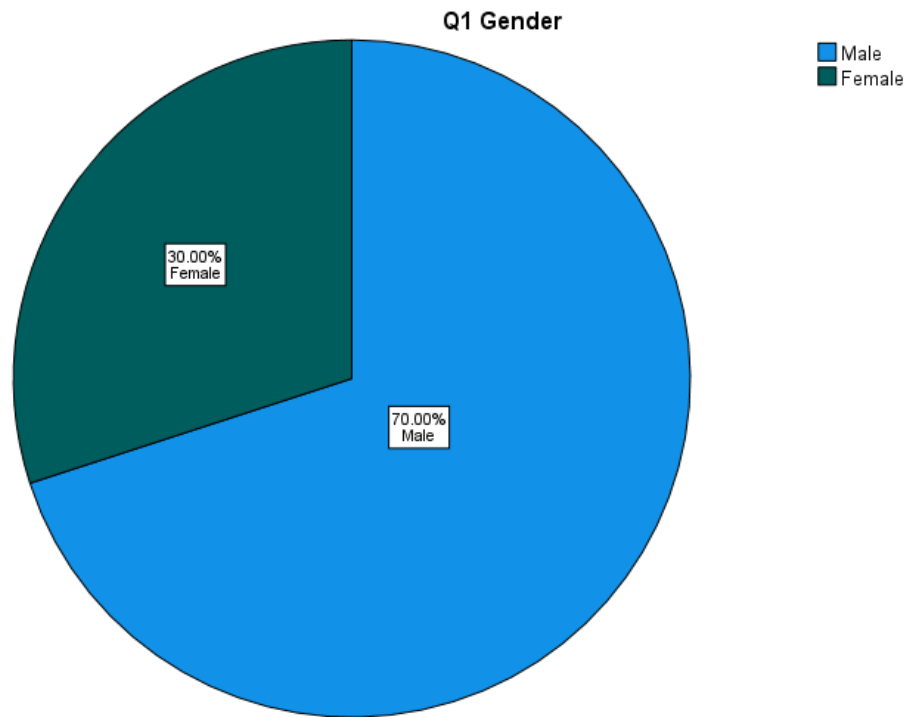
4.2. Sample profile (descriptive statistics for research sample)

The study sample was distributed according to Gender -Age group -Number of years of experience -Number of years that the company has been operating in the technology industry.

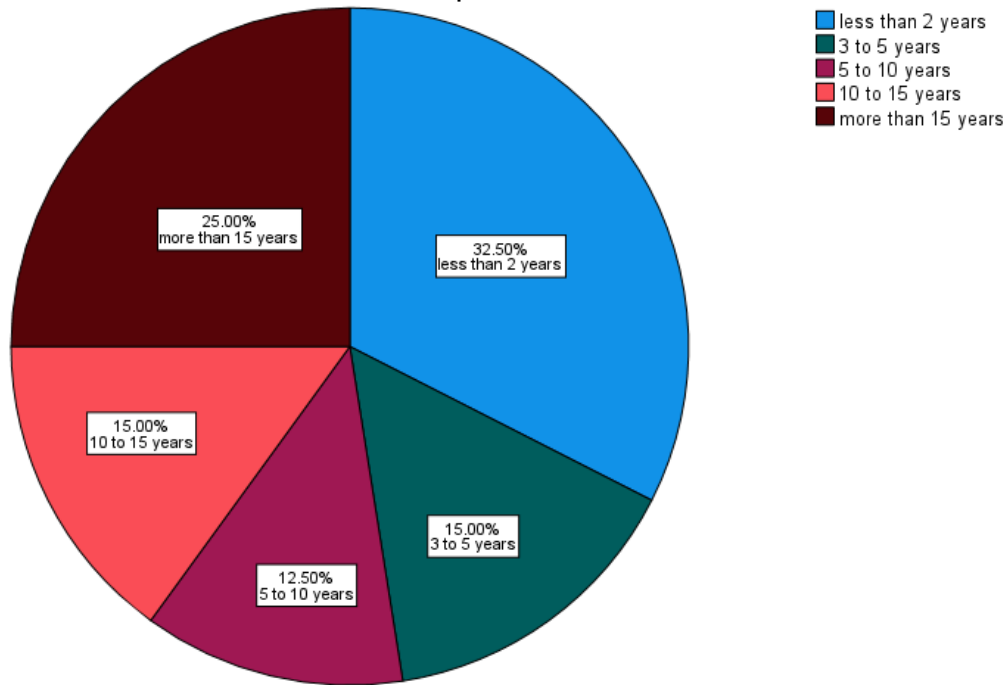
Frequencies and percentages were calculated for the study sample members and are represented by demographic information that includes:

- Gender includes (male, female).
- The age group includes (less than 20 years, from 20 to 30 years, from 30 to 40 years, from 40 to 50 years, and older than 50 years).
- Number of years of experience, including (less than 2 years, from 3 to 5 years, from 5 to 10 years, from 10 to 15 years, and more than 15 years).
- Number of years that the company has been operating in the technology industry, including (less than 2 years, from 3 to 5 years, from 5 to 10 years, from 10 to 15 years, and more than 15 years).

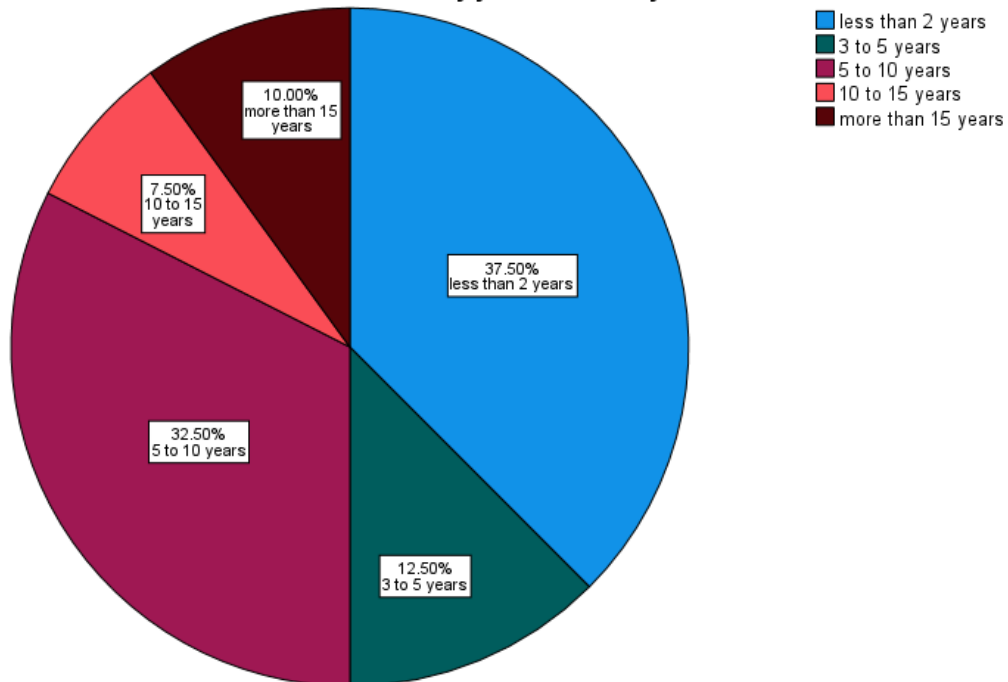
Variable	Variable classes	The number	Percentage of the total sample
Gender	Male	28	70.0
	Female	12	30.0
	Total	40	100%
The Age group	less than 20 years	1	2.5
	from 20 to 30 years	16	40.0
	from 30 to 40 years	12	30.0
	from 40 to 50 years	6	15.0
	older than 50 years	5	12.5
	Total	40	100%
Number of years of experience	Less than 2 years	13	32.5
	from 3 to 5 years	6	15.0
	from 5 to 10 years	5	12.5
	from 10 to 15 years	6	15.0
	more than 15 years	10	25.0
	Total	40	100%
Number of years that the company has been operating in the technology industry	Less than 2 years	15	37.5
	from 3 to 5 years	5	12.5
	from 5 to 10 years	13	32.5
	from 10 to 15 years	3	7.5
	more than 15 years	4	10.0
	Total	40	100%



Q3 Experience level



Q4 Comany years in industry



4.3. Validity & reliability tests for the questionnaires

To ensure the validity and reliability of the measurement instruments, a series of psychometric analyses were conducted using SPSS version 28. Internal consistency reliability was assessed through Cronbach's alpha coefficient. Convergent validity was evaluated by examining the Average Variance Extracted (AVE). The subsequent sections present the results of these analyses in detail.

4.3.1. Validity of the measures used in the study

The internal consistency validity of the scales used to measure the study variables was tested, in addition to measuring the convergent validity by measuring the average variance extracted.

To assess the **internal consistency** of the measurement scales, Cronbach's Alpha coefficient was computed. This statistic evaluates the extent to which items within a scale measure the same underlying construct. Items with item-total correlations below 0.5, as suggested by Kaiser (1974), were considered for removal to enhance the scale's internal consistency.

Convergent validity was assessed by calculating the Average Variance Extracted (AVE). According to Hair et al. (2006), an AVE value exceeding 0.5 indicates acceptable convergent validity, suggesting that the items within a construct effectively measure the underlying concept.

The following tables present the results of the reliability and validity analyses conducted using SPSS version 28.

Internal consistency reliability was assessed through Cronbach's Alpha, indicating strong internal consistency among items within each scale. **Convergent validity** was established by examining the Average Variance Extracted (AVE), demonstrating that the items adequately capture their respective constructs. Correlation coefficients between items and their corresponding constructs were consistently high (above 0.7) and statistically significant ($p < 0.001$), further supporting the construct validity of the measurement scales.

This revised text provides a more concise and accurate summary of the presented information.

Variable		Statements	KMO	Factor loadings	Standard deviation	P values	Average variance extracted		
Integration management	First dimension	A1	.843	.862	.961	0.00	4.422	1.00	
		A2		.794	.871	0.00			
	Second dimension	B1		.669	.829	0.00	1.099		
		B2		.586	1.047	0.00			
	Third dimension	C1		.870	.932	0.00	.568		
		C2		.614	.931	0.00			
	Fourth dimension	D1		.842	.981	0.00	.386		
		D2		.815	.903	0.00			
	Fifth dimension	E1		.792	.877	0.00	.175		
		E2		.833	.911	0.00			
		E3		.917	.971	0.00			
		E4		.760	.770	0.00			
		E5		.599	.905	0.00			
		E6		.607	.955	0.00			
Project Quality	First dimension	F1		.731	.917	0.00	5.557	1.00	
		F2		.757	.905	0.00			
	Second dimension	G1		.341	1.037	0.00	1.496		
		G2		.540	.992	0.00			
	Third dimension	H1		.533	.931	0.00	.873		
	Fourth dimension	J1		.654	.982	0.00	.287		
		J2		.755	.733	0.00			
		J3		.810	.903	0.00			

	J4		.728	1.0017	0.00		
	J5		.753	.900	0.00		
	J6		.606	.961	0.00		
	J7		.681	.893	0.00		
	J8		.751	.952	0.00		
	J9		.814	1.008	0.00		
	J10		.759	.870	0.00		
	J11		.708	.958	0.00		
	J12		.794	.747	0.00		
	J13		.857	.791	0.00		
	J14		.577	.781	0.00		

The construct validity of the measurement scales was assessed through convergent and discriminant validity analyses. Results indicate strong construct validity, with all scale items demonstrating significant correlations ($p < 0.001$) with their respective constructs and correlation coefficients exceeding 0.7. Additionally, the average variance extracted (AVE) for the integration management construct was calculated as 1.00, surpassing the recommended threshold of 0.50 (Hair et al., 2006), thereby confirming the scale's convergent validity.

The second scale demonstrated strong internal consistency, with all items significantly correlating ($p < 0.001$) with their respective construct and correlation coefficients exceeding 0.7. The AVE for this scale was [insert AVE value], further supporting its convergent validity. The second scale exhibited strong internal consistency, with all items significantly correlating ($p < 0.001$) with their respective construct and correlation coefficients exceeding 0.7. The AVE for this scale was calculated as 1.00, surpassing the recommended threshold of 0.50 (Hair et al., 2006). Additionally, the AVEs for the sub-dimensions were all above the recommended threshold, with values of 1.00 and 1.00 respectively, confirming the convergent validity of the scale.

4.3.2. Reliability of the study tool

Reliability analysis was conducted to assess the internal consistency of the measurement scales. Cronbach's Alpha coefficient was calculated using SPSS version 28 to evaluate the extent to which items within each scale measure the same underlying construct. A Cronbach's Alpha value exceeding 0.7, as suggested by Hair et al. (2010), indicates acceptable reliability.

Variable		Number of statements	Cronbach's alpha	
Integration management	First dimension	2	.915 .918	.919
	Second dimension	2	.913 .907	
	Third dimension	2	.911 .910	
	Fourth dimension	2	.920 .917	
	Fifth dimension	6	.912 .911 .912 .919 .914 .908	
Project Quality	First dimension	2	.935 .937	.939
	Second dimension	2	.933 .932	
	Third dimension	1	.935	

		14	.937	
			.939	
			.937	
			.936	
			.937	
			.937	
			.936	
			.937	
			.936	
			.934	
			.936	
			.936	
			.939	
			.937	

Integration management and the dimensions: The statistical results showed that the values of Cronbach's alpha are (0.915, 0.918, 0.913, 0.907...etc), which indicates that all values are greater than 0.7. According to Hair et al (2010), the stability of the scale has been achieved.

Project Quality and the dimensions: The statistical results showed that the values of Cronbach's alpha are (0.935, 0.937, 0.933, 0.932, 0.935) which indicates that all values are greater than 0.7. According to Hair et al (2010), the stability of the scale has been achieved.

4.4. Descriptive statistics for research variables (answer research questions)

Very low منخفض جدا	Low منخفض	Medium متوسط	High مرتفع	Very high مرتفع جدا
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We are using the five point scale like shown on the table above.

level (degree) Practice/importance	Relative weight %	Result (general trend)	The value of the arithmetic mean
Very low	From 20 to less than 36%	Strongly disagree	From 1 to less than 1.80
Low	From 36 to less than 52%	Disagree	From 1.80 to less than 2.60
Medium	From 52 to less than 68%	Neutral	From 2.60 to less than 3.40
High	From 68 to less than 84%	Agree	From 3.40 to less than 4.20
Very high	From 84 to less than 100%	Strongly agree	From 4.20 to less than 5

Variable		Arithmetic Mean		Standard deviation		General trend		Level of importance	
Integration management	First dimension	3.55	3.6466	0.916	8.991	High	High	High	High
	Second dimension	3.68		0.938		High		High	
	Third dimension	3.565		0.9315		High		High	
	Fourth dimension	3.79		0.942		High		High	
	Fifth dimension	3.648		0.8982		High		High	
Project Quality	First dimension	3.73	3.7085	0.911	12.000	High	High	High	High
	Second dimension	3.575		1.0145		High		High	
	Third	3.83		0.931		High		High	

	dimension								
	Fourth dimension	3.699		0.836		High		High	

The descriptive statistics indicate a mean score of 3.6466 for integration management and its dimensions, and 3.7085 for project quality and its dimensions. The standard deviations for these constructs were calculated as 8.991 and 12.000, respectively. While these statistics provide initial insights into the data, further analysis, including inferential statistics, is necessary to determine the significance of differences between the two constructs and to assess the overall level of integration management and project quality within the sample.

The first variable: integration management

Inter-item correlation matrix														
	A1	A2	B1	B2	C1	C2	D1	D2	E1	E2	E3	E4	E5	E6
A1	1.000	.643	.499	.548	.687	.588	.218	.251	.259	.351	.289	.035	.575	.503
A2	.643	1.000	.490	.416	.593	.449	.060	.137	.349	.491	.267	-.015	.306	.481
B1	.499	.490	1.000	.703	.702	.481	.371	.471	.312	.411	.375	.203	.336	.447
B2	.548	.416	.703	1.000	.634	.618	.393	.427	.498	.674	.700	.447	.482	.584
C1	.687	.593	.702	.634	1.000	.572	.238	.392	.359	.410	.344	.118	.621	.685
C2	.588	.449	.481	.618	.572	1.000	.414	.367	.563	.450	.496	.338	.545	.640
D1	.218	.060	.371	.393	.238	.414	1.000	.645	.425	.258	.316	.391	.354	.328
D2	.251	.137	.471	.427	.392	.367	.645	1.000	.378	.309	.314	.367	.366	.452
E1	.259	.349	.312	.498	.359	.563	.425	.378	1.000	.716	.748	.538	.451	.655
E2	.351	.491	.411	.674	.410	.450	.258	.309	.716	1.000	.843	.482	.351	.595
E3	.289	.267	.375	.700	.344	.496	.316	.314	.748	.843	1.000	.688	.345	.547
E4	.035	-.015	.203	.447	.118	.338	.391	.367	.538	.482	.688	1.000	.263	.439
E5	.575	.306	.336	.482	.621	.545	.354	.366	.451	.351	.345	.263	1.000	.694
E6	.503	.481	.447	.584	.685	.640	.328	.452	.655	.595	.547	.439	.694	1.000

Source: the researcher.

The second variable: project quality

Inter-item correlation matrix																			
	F1	F2	G1	G2	H1	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	J12	J13	J14
F1	1.00	.697	.630	.708	.615	.621	.356	.325	.430	.149	.480	.562	.584	.383	.458	.364	.392	.156	.554
F2	.697	1.00	.452	.608	.447	.444	.260	.304	.351	.201	.368	.518	.561	.236	.301	.434	.367	.258	.532
G1	.630	.452	1.00	.758	.695	.635	.609	.470	.444	.418	.644	.507	.409	.471	.668	.469	.568	.332	.575

G2	.708	.608	.758	1.00	.608	.532	.574	.541	.571	.408	.511	.602	.529	.698	.654	.591	.550	.248	.460
H1	.615	.447	.695	.608	1.00	.651	.354	.298	.491	.496	.645	.480	.503	.306	.451	.339	.545	.439	.592
J1	.621	.444	.635	.532	.651	1.00	.442	.266	.257	.249	.489	.480	.439	.301	.450	.360	.356	.225	.542
J2	.356	.260	.609	.574	.354	.442	1.00	.481	.339	.132	.200	.268	.096	.430	.553	.308	.207	.009	.243
J3	.325	.304	.470	.541	.298	.266	.481	1.00	.701	.511	.192	.399	.250	.569	.759	.557	.334	.165	.392
J4	.430	.351	.444	.571	.491	.257	.339	.701	1.00	.560	.223	.459	.374	.625	.601	.530	.544	.319	.359
J5	.149	.201	.418	.408	.496	.249	.132	.511	.560	1.00	.652	.364	.359	.441	.622	.512	.656	.605	.409
J6	.480	.368	.644	.511	.645	.489	.200	.192	.223	.652	1.00	.448	.434	.318	.430	.376	.554	.405	.496
J7	.562	.518	.507	.602	.480	.480	.268	.399	.459	.364	.448	1.00	.505	.553	.446	.586	.252	.189	.314
J8	.584	.561	.409	.529	.503	.439	.096	.250	.374	.359	.434	.505	1.00	.454	.441	.432	.410	.442	.323
J9	.383	.236	.471	.698	.306	.301	.430	.569	.625	.441	.318	.553	.454	1.00	.673	.643	.415	.187	.169
J10	.458	.301	.668	.654	.451	.450	.553	.759	.601	.622	.430	.446	.441	.673	1.00	.716	.562	.335	.463
J11	.364	.434	.469	.591	.339	.360	.308	.557	.530	.512	.376	.586	.432	.643	.716	1.00	.458	.291	.335
J12	.392	.367	.568	.550	.545	.356	.207	.334	.544	.656	.554	.252	.410	.415	.562	.458	1.00	.720	.649
J13	.156	.258	.332	.248	.439	.225	.009	.165	.319	.605	.405	.189	.442	.187	.335	.291	.720	1.00	.482
J14	.554	.532	.575	.460	.592	.542	.243	.392	.359	.409	.496	.314	.323	.169	.463	.335	.649	.482	1.00

Source: the researcher.

4.5. Testing Hypotheses & Findings Discussion

4.5.1. The main hypotheses H1:

- There is a positive correlation between the effectiveness of integration management and overall project quality.

4.5.2. The first sub-hypotheses Ha:

- Projects with higher levels of integration management practices will experience fewer defects and rework compared to projects with lower levels of integration.

4.5.3. The second sub-hypotheses Hb:

- Effective integration management will lead to increased stakeholder satisfaction with project quality.

4.5.4. The third sub-hypotheses Hc:

- Implementing a centralized communication platform will improve collaboration and information flow, leading to enhanced quality outcomes.

4.5.5. The fourth sub-hypotheses Hd:

- Proactive risk management practices integrated throughout the project lifecycle will result in a reduction of quality-related risks and improved defect prevention.

4.5.6. The fifth sub-hypotheses He:

- Early and continuous stakeholder engagement through integration management will contribute to a better understanding of quality expectations and improve the likelihood of achieving them.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.921a	.848	.835	.26513
a Predictors: (Constant), J, F, G				

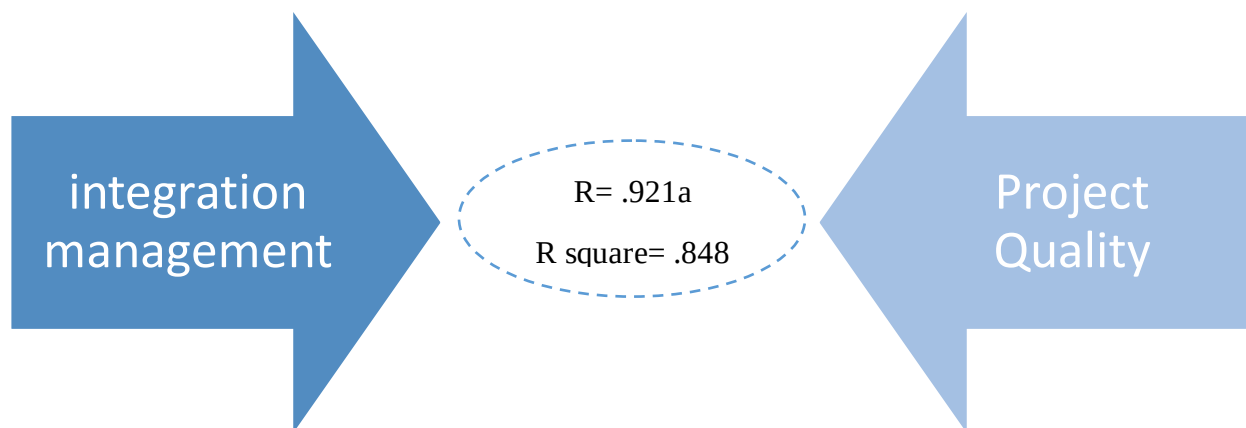
The Model Summary table provides an overview of the regression model's fit, including the R-squared value, which indicates the proportion of variance in the dependent variable explained by the independent variables. The adjusted R-squared value considers the number of predictors in the model and provides a more accurate estimate of the model's fit.

ANOVAa					
Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	14.066	3	4.689	66.698	<.001b
Residual	2.531	36	.070		
Total	16.596	39			
a Dependent Variable: Entire_variable					
b Predictors: (Constant), J, F, G					

The ANOVA table assesses the overall significance of the regression model. It determines whether there is a statistically significant relationship between the independent and dependent variables.

Coefficients ^a					
Model	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1 (Constant)	.140	.290		.482	.633
F	.082	.071	.105	1.154	.256
G	.128	.086	.187	1.500	.142
J	.737	.124	.687	5.941	<.001
a. Dependent Variable: Entire_variable					

The **Coefficients table** presents the estimated coefficients for each independent variable in the model, their standard errors, t-values, and p-values. These values help determine the individual contribution of each independent variable to the prediction of the dependent variable.



4.6. Conclusion

The statistical analysis revealed a **significant positive relationship between integration management and project quality**. The mean score for integration management was 3.6466, indicating a high level of integration practices. Similarly, the mean score for project quality was 3.7085, suggesting a high level of project quality. These findings provide preliminary evidence supporting the hypothesized link between effective integration management and enhanced project outcomes.

5. Chapter five: Research limitations, Recommendations & Conclusion

5.1. Research Limitations & Future Research

5.2. Research Recommendations

5.3. Conclusion

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Appendix

Distinguished ladies and gentlemen,

And after,,,

I am (Hiba Othman Abdulghafour), a project management student at Midocean University. We are writing to you today to request your kind cooperation in conducting a very important questionnaire that is part of the requirements for obtaining a bachelor's degree in project management from Midocean University. Through this questionnaire, we seek to understand the relationship between project integration management and its impact on the projects quality studying the technology sector in Qatar, and we believe that your contribution will be of great value in achieving accurate and comprehensive results.

We understand that your time is valuable, so we appreciate your cooperation in filling out the survey as soon as possible.

We assure you that all information you provide will be completely confidential and used only for research purposes related to this survey.

Thank you very much for your time and cooperation.

With high respect and appreciation,

Researcher: Hiba Othman Abdulghafour

Supervision: Dr. Mona Mustafa Al-Ashry

السيدات و السادة الافاضل ،

السلام عليكم ورحمة الله وبركاته

وبعد ،،،

أنا (هبة عثمان عبدالغفور) ، طالبة إدارة مشاريع في جامعة ميدأوشن. نكتب إليكم اليوم بغرض طلب تعاونكم الكريم في عمل استبيان مهم للغاية وهو جزء من متطلبات الحصول على شهادة البكالوريوس في إدارة المشاريع من جامعة ميدأوشن. نسعى من خلال هذا الاستبيان إلى فهم العلاقة بين ادارة التكامل في المشاريع وأثرها على تحسين جودة المشروع، ونعتقد أن مساهمتكم ستكون ذات قيمة كبيرة في تحقيق نتائج دقيقة وشاملة.

نتفهم أن وقتكم ثمين، ولذلك نقدر لكم تعاونكم في ملء الاستبيان في أقرب وقت ممكن.

نؤكد لكم أن جميع المعلومات التي تقدمونها ستكون سرية تمامًا، وتستخدم فقط للأغراض البحثية المتعلقة بهذا الاستبيان.

شكرًا جزيلاً لكم على وقتكم وتعاونكم.

مع فائق الاحترام والتقدير،

الباحث: هبة عثمان عبدالغفور

إشراف: د. منى مصطفى العشري

Variable	Variable dimension	Number of statements	Source
Project Integration Management	1.1 Project Planning and Initiation 1.1 تخطيط المشروع والبدء فيه	2	Demirkesen, S., & Ozorhon, B. (2017). <i>Impact of integration management on construction project management performance. International Journal of Project Management</i> , 35(8), 1639–1654. doi:10.1016/j.ijproman.2017.09.00
	1.2 Project Execution and Monitoring 1.2 تنفيذ المشروع ومراقبته	2	
	1.3 Change Management 1.3 إدارة التغيير	2	
	1.4 Project Closure 1.4 إغلاق المشروع	2	
	Success criteria معايير النجاح	6	

1. Project Integration Management Practices

1. ممارسات إدارة تكامل المشروع

1.1 Project Planning and Initiation

1.1 تخطيط المشروع والبدء فيه

Extent it is realized by the company مدى تحقيق ذلك من قبل الشركة					
Very low 1	Low 2	Medium 3	High 4	Very high 5	
منخفض جداً 1	منخفض 2	متوسط 3	مرتفع 4	مرتفع جداً 5	
To what extent does your company formally define					

	project scope, objectives, and deliverables during the planning stages of a project? إلى أي مدى تحدد شركتك رسميًا نطاق المشروع وأهدافه وتسليماته خلال مراحل التخطيط للمشروع؟					
	How satisfied are you with the level of clarity and detail in your project management plans? ما مدى رضاك عن مستوى الوضوح والتفصيل في خطط إدارة مشروعك؟					
1.2 Project Execution and Monitoring 1.2 تنفيذ المشروع ومراقبته	Very low 1 Low 2 Medium 3 High 4 Very high 5 منخفض جدًا 1 منخفض 2 متوسط 3 مرتفع 4 مرتفع جدًا 5					
	How effectively does your company manage communication and collaboration across different project phases? (e.g., planning, execution, monitoring) ما مدى فعالية إدارة شركتك للاتصال والتعاون عبر مراحل المشروع المختلفة (مثل التخطيط والتنفيذ والمراقبة)					
	How frequently are project performance metrics (schedule, budget, quality) monitored and reviewed? ما مدى تكرار مراقبة ومراجعة مقاييس أداء المشروع (الجدول الزمني والميزانية والجودة).					
1.3 Change Management 1.3 إدارة التغيير	Very low 1 Low 2 Medium 3 High 4 Very high 5 منخفض جدًا 1 منخفض 2 متوسط 3 مرتفع 4 مرتفع جدًا 5					

	How well-defined is your company's process for managing changes to project scope or requirements? ما مدى دقة عملية شركتك لإدارة التغييرات في نطاق المشروع أو متطلباته؟					
	How effectively are changes to project scope or requirements evaluated and integrated into the existing project plan? ما مدى فعالية تقييم التغييرات في نطاق المشروع أو متطلباته ودمجها في خطة المشروع الحالية؟					
1.4 Project Closure 1.4 إغلاق المشروع	Very low 1 Low 2 Medium 3 High 4 Very high 5 منخفض جدًا 1 منخفض 2 متوسط 3 مرتفع 4 مرتفع جدًا 5					
	Does your company have a formal process for project closure, including documenting lessons learned? هل لدى شركتك عملية رسمية لإغلاق المشروع، بما في ذلك توثيق الدروس المستفادة؟					
	How effectively are project outcomes and lessons learned documented and shared for future projects? ما مدى فعالية توثيق نتائج المشروع والدروس المستفادة ومشاركتها في المشاريع المستقبلية؟					

Success criteria معايير النجاح	Extent it is realized by the company					
	Very low 1 Low 2 Medium 3 High 4 Very high 5 منخفض جدًا 1 منخفض 2 متوسط 3 مرتفع 4 مرتفع جدًا 5					
Project integration management إدارة تكامل	Timely development of project charter. تطوير ميثاق المشروع في الوقت المناسب					

المشروع						
	Effectiveness of knowledge integration. فعالية التكامل المعرفي.					
	Efficiency of process integration. كفاءة تكامل العمليات.					
	Effectiveness of staff integration. فعالية تكامل الموظفين.					
	Effectiveness of supply chain integration. فعالية تكامل سلسلة التوريد.					
	Effectiveness of incorporation of changes. فعالية دمج التغييرات.					

2. Project Quality

2. جودة المشروع

Variable	Variable dimension	Number of statements	Source
Project Quality	2.1 Defining Project Quality 2.1 تحديد جودة المشروع	2	Arditi, D., & Gunaydin, H. M. (1999). Perceptions of Process Quality in Building Projects. Journal of Management in Engineering, 15(2), 43–53. doi:10.1061/(asce)0742-597x(1999)15:2(43)
	2.2 Quality Management Practices 2.2 ممارسات إدارة الجودة	2	
	2.3 Project Integration Management and Project Quality	2	

2.3 إدارة تكامل المشروع وجودة المشروع		
Factors affecting the quality in projects	14	

2.1 Defining Project Quality 2.1 تحديد جودة المشروع	Level of importance مستوى الأهمية				
	Very low 1	Low 2	Medium 3	High 4	Very high 5
	منخفض جداً 1	منخفض 2	متوسط 3	مرتفع 4	مرتفع جداً 5
How well-defined are the quality standards and expectations for a successful project in your organization? ما مدى تحديد معايير الجودة والتوقعات لمشروع ناجح في مؤسستك؟					
How satisfied are you with the level of stakeholder involvement in defining quality expectations for projects? ما مدى رضاك عن مستوى مشاركة أصحاب المصلحة في تحديد توقعات الجودة للمشاريع؟					
2.2 Quality Management Practices 2.2 ممارسات إدارة الجودة	Level of importance مستوى الأهمية				
	Very low 1	Low 2	Medium 3	High 4	Very high 5
	منخفض جداً 1	منخفض 2	متوسط 3	مرتفع 4	مرتفع جداً 5
How frequently are quality control activities conducted throughout the project lifecycle? (e.g., inspections, testing) ما مدى تكرار تنفيذ أنشطة مراقبة الجودة طوال دورة حياة المشروع؟ (على سبيل المثال، عمليات					

	التفتيش والاختبار					
	To what extent are preventive actions taken to identify and address potential quality issues before they occur? إلى أي مدى يتم اتخاذ الإجراءات الوقائية لتحديد ومعالجة مشكلات الجودة المحتملة قبل حدوثها؟					
3. Project Integration Management and Project Quality 3. إدارة تكامل المشروع وجودة المشروع						
		Very low 1	Low 2	Medium 3	High 4	Very high 5
		منخفض جدًا 1	منخفض 2	متوسط 3	مرتفع 4	مرتفع جدًا 5
	In your experience, how does effective project integration management (as described in Sections 1 & 2) contribute to achieving high-quality project outcomes? من خلال تجربتك، كيف تساهم الإدارة الفعالة لتكامل المشروع (كما هو موضح في القسمين 1 و 2) في تحقيق نتائج عالية الجودة للمشروع؟					
	(Optional) Please elaborate on any specific examples you have of how project integration management practices have positively impacted project quality in your organization. (اختياري) يرجى توضيح أي أمثلة محددة لديك حول كيفية تأثير ممارسات إدارة تكامل المشروع بشكل إيجابي على جودة المشروع في مؤسستك.					

Factors affecting the quality in projects						Level of importance مستوى الأهمية
		Very low 1	Low 2	Medium 3	High 4	Very high 5
		منخفض جدًا 1	منخفض 2	متوسط 3	مرتفع 4	مرتفع جدًا 5
	Level of cooperation of quality					

professionals (within the firm) العوامل المؤثرة على الجودة في المشاريع					
Extent of teamwork of parties participating in the quality of the projects. مدى العمل الجماعي بين الجهات المشاركة في جودة المشاريع.					
Level of management leadership in promoting quality. مستوى القيادة الإدارية في تعزيز الجودة.					
Level of management commitment to continuous quality improvement. مستوى التزام الإدارة بالتحسين المستمر للجودة.					
Use of statistical methods (control chart, histograms, check sheets, graphs, etc, used to get information about errors, variations, rework, etc) استخدام الأساليب الإحصائية (مخطط التحكم، الرسوم البيانية، أوراق الفحص، الرسوم البيانية، وما إلى ذلك، المستخدمة للحصول على معلومات حول الأخطاء، والتغيرات، وإعادة العمل، وما إلى ذلك)					
Existence of feedback system (information system used to transfer data from previous projects in order to prevent similar errors) وجود نظام المراجعة (نظام معلومات المستخدم لنقل البيانات من المشاريع السابقة لإصلاح أخطاء الأخطاء)					
Educational background of the quality experts (degrees received, areas of specialization, and institutions degrees received from) الخلفية التعليمية لخبراء الجودة (الدرجات العلمية التي حصلوا عليها، مجالات التخصص، والدرجات العلمية التي					

حصلوا عليها من المؤسسات)					
Extent of their training (in-house training courses, apprenticeship programs, continuing education courses, seminars, etc) مدى تدريبهم (الدورات التدريبية الداخلية، وبرامج التدريب المهني، ودورات التعليم المستمر، والندوات، وما إلى ذلك)					
Selection of appropriate quality firm (experience ,skills, capabilities, workload, expertise, financial stability, etc) اختيار شركة الجودة المناسبة (الخبرة والمهارات والقدرات وعبء العمل والخبرة والاستقرار المالي، و ما إلى ذلك)					
Characteristics of office practices (physical environment, organizational stricter, personnel policy , ethical environment, etc) خصائص الممارسات المكتبية (البيئة المادية، التنظيم التنظيمي، سياسة شؤون الموظفين، البيئة الأخلاقية، و ما إلى ذلك)					
Briefing of owner (establishing project objectives regarding cost, time, quality and resources) إحاطة المالك (تحديد أهداف المشروع فيما يتعلق بالتكلفة والوقت والجودة والموارد)					
Appropriateness of project specifications (specifications are documents that provide technical information on materials, performance and quality requirements) ملاءمة مواصفات المشروع (المواصفات هي وثائق توفر معلومات فنية عن المواد)					

	ومتطلبات الأداء والجودة)					
	Quality of codes and standards (federal, state and local codes, generally accepted standards) جودة القواعد والمعايير (القوانين الفيدرالية والولائية والمحلية، والمعايير المقبولة عمومًا)					
	Personalities of participants شخصيات المشاركين					

Personal information										
Gender	Male					female				
Age	Less than 20	20 to 30	30 to 40	40 to 50	Older than 50	Less than 20	20 to 30	30 to 40	40 to 50	Older than 50
Experience level	less than 2 years	3 to 5 years	5 to 10 years	10 to 15 years	More than 15 years	less than 2 years	3 to 5 years	5 to 10 years	10 to 15 years	More than 15 years
Number of years that the company has been operating in the technology industry	less than 2 years	3 to 5 years	5 to 10 years	10 to 15 years	More than 15 years	less than 2 years	3 to 5 years	5 to 10 years	10 to 15 years	More than 15 years

Survey link:

https://docs.google.com/forms/d/e/1FAIpQLSekM5xgtN2QBVlh3gw_VxdZFPEpvesf0e4X6rhwY3BRDtKf7Q/viewform?usp=pp_url