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The impact of Agile Methodology on the Success of Technology Projects

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Abstract

In the rapidly evolving world of technology, many companies struggle to meet deadlines, adapt to changing consumer needs, and provide high-quality goods and services. In these dynamic environments, traditional project management techniques often fall by the wayside. This is where the Agile methodology comes in. It is a flexible, team-oriented approach to completing tasks quickly and effectively, based on the software development industry in which it originated. It emphasizes collaboration, rapid development cycles, and feedback. This study examines how Agile project management impacts technology projects in the IT department of Alfano Company in Riyadh, Saudi Arabia, based on project success. The study aims to determine how Agile is used to truly focus on projects and whether it actually produces better results by studying project managers in the public and commercial sectors. The study will utilize a number of surveys and empirical information from IT project management professionals. We will also address the challenges, benefits, and lessons learned from implementing Agile in practice. In this article, we aim to provide real-life examples and a human-centered perspective on how Agile can improve the outcomes of technology projects. This research seeks to illustrate the story of the transformation that the Agile methodology can achieve, whether you are a project manager, trying to make a decision yourself, or simply interested in learning how contemporary project teams work.

Keywords: Agile methodology, Technology projects, project success.

Chapter 1

The impact of Agile Methodology on the Success of Technology Projects

1.1 Introduction

Imagine trying to build a house while the ground shakes like an earthquake. These days, managing technical projects can be similar. Everything is changing: shorter timeframes, tighter budgets, changing customer expectations, and new technologies. In this sense, project success isn't just about adhering to a plan, it's about quickly learning, adapting, and delivering value. This is the essence of the Agile methodolog..¹

Agile was formally established in 2001 when a group of influential, hesitant software developers who saw the need for a new method signed the Agile Manifesto. Customers' cooperation over contract negotiations, functional software over extensive documentation, adapting to change rather than sticking to a plan, and people and interactions over procedures and tools were all things they appreciated. In the last twenty years, Agile has expanded well beyond software. Applications for it are now found in a wide range of sectors, including IT, manufacturing, and marketing. Agile has been used by numerous Saudi companies, like Alfano, to improve technology project management in recent years.²

Here's a question, though: Does Agile work? That is what this study aims to explore, specifically with regard to IT department. We're going to examine whether Agile is superior to waterfall in terms of raising project success rates, team cooperation, and customer

¹ Highsmith, J. (2009). Agile Project Management: Creating Innovative Products (2nd ed.).

² Dingsøyr, T., Nerur, S., Balijepally, V., & Moe, N. B. (2012). A decade of agile methodologies: Towards explaining agile software development. *Journal of Systems and Software*, 85(6), 1213–1221

happiness. We will also explore how teams deal with and overcome real-world obstacles while switching from waterfall to Agile. It's helpful to reflect on our past in order to understand Agile's place in the IT industry in 2019. ³

Conventional companies employed conventional project management, which was similar to the Waterfall technique (complete each step before moving on). However, this paradigm was overly rigidly planned and predictable. Teams had to start over or add features whenever the project's scope changed in the middle, which led to delays, cost overruns, or complete failure.

⁴

However, the rapid advancement of technology necessitated a more responsive and flexible approach. Consumers began to demand greater features, faster feedback loops, and more regular upgrades. Project teams and developers needed a framework that would allow them to stay up without being hindered by outdated procedures. Agile was developed as a reaction to this altered reality. ⁵

Agile's focus on functional software, team power, and short development windows (sprints) transformed the field of project management. It made space for innovation and the pursuit of excellence. Customers felt more involved in the process, teams could quickly adjust to changes, and goods could be released in smaller but meaningful steps. Agile was not widely adopted, but it did extend across sectors internationally. Older businesses and the public sector took longer to adopt the concept, while internet giants like Google and Amazon did so

³ Serrador, P., & Pinto, J. K. (2015). Does Agile work? A quantitative analysis of Agile project success. *International Journal of Project Management*, 33(5), 1040–1051.

⁴ Boehm, B. (2002). Get ready for agile methods, with care. *Computer*, 35(1), 64–69.

⁵ Conforto, E., Salum, F., Amaral, D. C., da Silva, S. L., & de Almeida, L. F. M. (2016). Can Agile project management be adopted by industries other than software development? *Project Management Journal*, 47(3), 21–34.

right away. Agile is still in its infancy in the Kingdom of Saudi Arabia, mostly due to the digital transformation initiative spearheaded by Vision 2030.⁶

Agile adoption is no longer a make-or-break need for many businesses, but rather a competitive advantage. The IT function is a crucial enabler supporting internal processes, innovation, and the digital backbone at Alfano, one of the electrical manufacturers and providers of digital solutions. Alfano faces pressure, like many other businesses, to finish technology projects faster and to stakeholders' satisfaction. As a result, there is now more interest in using Agile with project teams. However, implementing Agile requires more than merely flipping a switch. It requires training, a shift in leadership style, a willingness to try new things, and a culture change.⁷

No team ever accomplishes it correctly the first time. Because of this, there are certain important lessons to be learned from implementing Agile in a real-world environment, like Alfano's IT Department. The purpose of this post is not to promote Agile as a panacea. Instead, it attempts to tell the tale of a major corporation in the kingdom attempting to update its project management. By compiling insights from IT project managers in the public and commercial sectors, this research seeks to show how to succeed, how to fail, and why.

The future is a people issue as much as a process one. Learn how teams are navigating the shift from planning-centric patterns to delivery-centric practices, and from strict control to facilitated collaboration, in this study. In the process, we could learn more about Agile's potential benefits for both projects and the individuals who work on them. Through Agile, we are embarking on this exciting journey to test as intended.⁸

⁶ VersionOne. (2020). 14th State of Agile Report.

⁷ Rigby, D. K., Sutherland, J., & Takeuchi, H. (2016). Embracing Agile. *Harvard Business Review*, 94(5), 40–50.

⁸ Chow, T., & Cao, D. (2008). A survey study of critical success factors in agile software projects. *Journal of Systems and Software*, 81(6), 961–971.

1.2 Statement of the Problem

Technology project management has witnessed significant evolution in recent years, driven largely by the proliferation of digital solutions and the increasing reliance on software tools across various sectors. These changes have led to significant challenges: customer needs are more complex, product lifecycles are shorter, and technological advancements are occurring at an unprecedented pace. In this ever-changing landscape, we are now seeing companies begin to realize that traditional project management methods, such as Waterfall, are insufficient to keep pace with rapid changes.

This realization has led to the emergence of the Agile methodology as one of the most anticipated modern strategies for technology projects, which relies on a flexible and reactive system. Traditional methodologies assume the possibility of fully planning the project from the outset, while Agile recognizes that requirements are subject to change, and that it is better to respond quickly rather than strictly adhere to the original plan.

However, while Agile may seem attractive in theory, it is actually much more challenging. Many companies, particularly those with Arab backgrounds, believe that the Agile methodology is simply a recipe for success, and that the necessary culture and level of preparedness are lacking. Agile methodology is often used superficially, or reduced to specific practices or tools, rather than as an integrated approach to thinking and values.

We now know that technology projects still suffer from poor performance despite Agile's entrenchment in the modern business world. For example, some reports indicate that while some Agile projects are entirely successful, many fall short of expectations in terms of time, cost, and customer satisfaction. These figures raise fundamental questions:

- Does Agile actually improve project outcomes?

- Are organizations implementing it correctly?
- What determines its effectiveness and success?

Based on this reality, a research gap can be identified: the need to study the true relationship between the implementation of Agile methodologies and the success of technology projects in Saudi companies (not only through descriptive or theoretical assessments, but also through empirical analysis based on field data collected from companies like Alfano that are adopting Agile in the Arab workplace). Second, most studies on this issue have been conducted in the West or in large multinational organizations. Regarding the first, Arab organizational environments are characterized by cultural and structural differences, which impact how Agile methodology is applied and change is controlled. Therefore, the necessity and urgency of this local Arab effort is evident.

Study Methodology: The study methodology is a case study of Alfano's IT department, a standard approach for individual case studies. This research paper examines the contribution of Agile methodology to project success and how its use affects team performance, delivery time, stakeholder satisfaction, and project outcomes.

The main issue of this research can be formulated in the following research question: How do successful technology projects in a Saudi organization like Alfano benefit from Agile methodology?

Several sub-questions arise from this central question.

1. To what extent do technology organizations value Agile principles and tools?

2. How does the application of Agile impact performance metrics (time, cost, product quality, and customer satisfaction) at the project level?
3. What are the challenges and barriers that prevent organizations from adopting Agile methodology?
4. Are factors such as team spirit, project size, or managerial influence the cornerstone of Agile adoption or failure?
5. Organizational maturity of an Agile adopter: Does it contribute to the success of IT projects?

1.3 Significance of the Study

In a world of intense and constant technological innovation, technology project management has truly become a strategic issue for organizations, private or public. Now we are in the age of digital transformation and project management is no longer seen as a technical, internal process. Instead, it has evolved into an essential means of checking whether the organisation can innovate, respond, and deliver that last mile, that last kilogramme of value.

From this perspective, we can realize the significance of the modern approaches of project management, particularly Agile Methodology as it has shifted from being a contemporary management trend to a standard model in big world companies. From software development, cloud services, and AI, all the way to public sector projects in areas such as Education and Health, agile is now part of the way of creating projects.

Yet, despite this, there is no shortage of questions around Agile effectiveness—especially in companies of Saudi Arabia kingdom like Alfanoor, where there are cultural and organizational differences from the context that gave birth to Agile. This is why the current study is of such importance, due to a noticeable gap between theory and practice, between what promises it all and what is scientifically defensible, and between mere attendance and a true implementation.

1.3.1 Scientific (Theoretical) Significance

First: Enriching Arabic-language academic literature

It is worth mentioning that, whereas Agile is adopted by many Arab technology organizations, there is a lack of academic literature in Arabic, where Agile is systematically and analytically assessed in terms of its effectiveness on project performance. In this sense,

This research offers an important contribution for researchers and students in the areas of public policy, public administration, project management, and digital transformation.

Second: A modern applied theoretical framework

The research utilises modern management theories such as Open Systems Theory (OST), Contingency theory, and Agile Maturity Model (AMM), and combines them to outline an organic and systematic scientific framework linking the theory to the practical reality. This model facilitates comparison across other settings and can be compared with future studies.

Third: Testing measurable hypotheses

In comparison with descriptive studies, the present study provides hypotheses that could be tested through quantitative analytic methods, therefore increasing its scientific rigor and the reliability of its conclusions.

1.3.2 Practical (Applied) Significance

First: Enabling the informed decision making of organizations like Alfannar

The anticipated findings of this study will help project and institutional managers in measuring the success of the Agile implementation of their organizations, assessing the

strengths and weaknesses, and selecting the most appropriate methods for their organizational situation.

Second : to have actionable-performance improvement alerts.

By evaluating the link between Agile deployment and the performance indicators (e.g., time, cost, quality, customer satisfaction), our research provides useful evaluation instruments that companies like Alfanar can use to assess and improve their internal performance.

Third: Supporting the digital transformation process of Arab entities

Given that so many Arab governments and institutions are moving into the e-realm, this paper is an operational reference delineating the need for suitable management tools. Proper Agile enablement can help in digital transformation initiatives and also decrease the failure rate of digital projects.

1.3.3 Professional Relevance

- For our software: The research provides actionable advice for software developers, product managers, and engineering teams.
- For trainers and consultants: Suggests that content-rich, practical workshops on effective Agile practices are justified.
- For universities: Findings of the research can be used as a reference point for new programs in PM and organizational innovations for enhancing the education process.

1.3.4 Significance within the Arab Context

Most previous studies have originated from Western countries hence they may not be seamlessly applicable to the ARW, which is characterized by different cultural, administrative, and structural components. This research is one of the few pieces of empirical work investigating Agile implementation in a real Arab world, endowing it with significant contextual value and rendering its contributions widely applicable to both academia and industry.

1.4 Study Objectives

The primary goal of this study is to assess the influence of the Agile approach how successful Technology projects get delivered, in Alfanzars IT Department as a case study. Overall, the

study seeks to fill the space between agile theory and practice within a Saudi Arabian setting, and learn from both, success and failures.

This research seeks a related set of theoretical and practical goals, all coordinated to develop an advanced understanding of how Agile use has its effects on technology project performance.

1.4.1 Main Objectives of the Study

a. To what extent is Agile practiced in technology companies like Alfanzar?

The intent of study is to measure how effectively organizations like Alfanzar on-board Agile values and practices (Scrum, Kanban, daily standups, and iterative releases). Further, are they following Agile in a superficial (or totemic) way or a true embodiment as part of the organization's culture – that promotes collaboration, improvements in small, and adaptation to change?

b. To evaluate the effect of Agile adoption on critical project success factors

This target is an assessment of the degree the adoption of Agile is correlated to technology project performance. In particular, it analyses four primary success indicators:

- Adherence to schedule (Time Management)
- Budgeting and cost management (Cost Management).
- Quality of the end product (Product Quality)
- Satisfaction of the customer and of the end user (Satisfaction).
- Through statistical analysis, we will analyze the relationship between each metric and the maturity of Agile practices.

c. To discover the hurdles that companies encounter while adopting Agile

Adopting Agile is not enough on its own to succeed. In reality, the cultural, organizational, or technology-related hurdles make enabling this difficult. The research in the area should seek to identify some of the most important challenges such as:

- Teams poor knowledge of Agile principles
- Resistance to change
- Lack of adequate training
- Weak or absent managerial support

By examining these obstacles, I hope to make practical suggestions for achieving better Agile results.

d. To explore the moderating factors affecting the Agile–success relationship

The research examines whether issues such as project size, team makeup, employee experience, and manager support may influence the impact of Agile in carrying them between

projects. It gives you that sense of “what seems to work with Agile better,” and the whole notion of “contextual fit” — where you can’t apply a one-size-fits-all approach to PMM.

1.4.2 Secondary and Supporting Objectives

Besides the major objectives, this research also intends to accomplish a number of complementary objectives that aim to provide more comprehensive and practical insight at the organization of Agile:

- Formulate a theoretical model that can be applied to evaluate an Organisation’s SciETY readiness.
- To distinguish between companies that have advanced in Agile practices and those who are beginning their journey.
- To articulate the impact of Agile practices on the overall organization.
- To contribute measurable performance measurements that institutions may use to monitor progress after their Agile implementation.
- Addressing the scarcity of strong theoretical and practical value-added content in Arabic academic literature with a structured study on Agile that is of high practical value and can act as a guideline for further research.

1.4.3 Visionary Purpose (Long-Term Goal)

At a more general level, the purpose of this study is to promote an applied scientific perspective that will assist saudi institutions, and particularly those in the process of digital transformation like Alfamar, to identify and apply the most appropriate methodologies for project management. It’s also about promoting an organizational culture that doesn’t view Agile as “just another transient fad” but as a true change in mindset and values about how work gets done and value is delivered.

1.5 Research Questions

Because this research area is multi-faceted, it is obvious that one straight question is not enough to cover its complexity. Hence, the research problem is further decomposed into a series of specific sub-questions that not only direct the collection of data, but also serve as a basis for empirical analysis.

They were devised in a linear manner to address the major issues of Agile diffusion, adaptation, resistance and its fit with Alfamar company.

1.5.1 Main Research Question

To what extent does the use of Agile methodology contribute to the success of technology projects in Alfamar?

This primary question seeks the underlying purpose of the research study and analyzes the effects of the independent variable (Agile implementation) on the dependent variable (Project success).

1.5.2 Sub-Questions

- a. How many companies that work mostly in technology are using these methodologies and what is their effectiveness?

This question is to get a sense of how Agile is being done - very well, in words only or a mismatch of theory and practice.

- b. To what extent is the application of Agile practice affecting project success in the context of:
 - Adherence to project timelines.
 - Budget and cost control.
 - Timing/quality of tech or software deliverables.
 - Customer and end-user satisfaction.

These are the Four Pillars of any successful project. This research seeks to analyze the direct influence of Agile over each measure, and overall project outcomes.

- c. What difficulties and barriers do Saudi organizations, especially Alfannar, face when implementing the Agile methodology?

Agile in and of itself very often does not fail due to its structure, but due to internal issues—team culture, no leadership or vague role definitions. This problem investigates these obstacles to clarify why findings differ between agencies.

- d. What are the organizational, and human aspects affecting the success of an Agile implementation?

Specifically:

- Does team size matter?
- What influence does team experience have on the results?
- Is Agile appropriate for simple or complex tasks?
- To what extent does executive support matter?

- e. How does availability of train match with adoption?

Such insights can help understand the context in which Agile is most effective.

- f. How mature are organizations like Alfamar in their Agile thinking, and how does this thinking manifest itself on projects?

It is important to know where a company is in its Agile journey. Has it just started? Is it fully integrated? For the study this question is an important informative aspect.

1.6 Research Hypotheses

The examination of Agile uptake and technology project in Alfamar company success would benefit from a well-defined and testable set of hypotheses. These hypotheses are tentative a priori beliefs based on theory or activity theory and literature that will be tested by empirical data and statistics.

They assist in turning the research questions into testable statements, allowing the researcher to identify patterns, interpret the relationships, and develop supportable recommendations.

1.6.1 Main Hypothesis

- **H₀ (Null Hypothesis):**

The success of technology projects in Alfamar company is not statistically influenced by the adoption of Agile.

- **H₁ (Alternative Hypothesis):**

Agile and its impact on technology project success: A systematic literature review.

This is the central hypothesis of the work, and the authors attempt to ascertain if Agile practices have a direct effect on project results such as time, cost, quality, and customer satisfaction.

1.6.2 Sub-Hypotheses

- **H1:**

The degree of Agile adoption and delivering projects on time are statistically significant.

Why: Agile implements time-boxed Sprints to ensure a regular release of a working product.

- **H2:**

It has been proven by our studies that there was a positive correlation between the Agile method and project cost control.

Why: In Agile we allow detection in early steps so cost can also be reduced.

- **H3:**

There is a statistically significant association between the use of Agile and the quality of technical or software deliverables.

Reason: Product quality is enhanced by ongoing testing, feedback, and collaboration.

- **H4:**

There is a correlation between the use of Agile and customer satisfaction that is likely, even expected, to be a statistically significant one.

Reason: The customers' involvement in Agile prevents the development of unwanted deliverables.

1.6.3 Moderating and Mediating Variable Hypotheses

- **H5:**

Project success factors depend on the Agile maturity level of the organization.

Why: Early adopters of Agile tend to deliver average results and inferior results compared to the average in the market but mature adopters of Agile have a higher probability to deliver consistent and superior results.

- **H6:**

Organizational culture significantly moderates the relationship between Agile application and project success.

Because even the best methodologies will fail in cultures that do not value collaboration, transparency, and continuous learning.

- **H7:**

There is also a relationship between Agile and the success of the project where the relationship is influenced by complexity and size of the project.”

Rationale: Agile doesn't work as well in large bureaucratic efforts as it may in smaller or highly iterative ones.

○ **H8:**

The role of management support and clarity in Agile implementation effectiveness.

Why: Without the support of leaders or a clear understanding of responsibilities (e.g., roles of Product Owner, Scrum Master), Agile practices are weakened.

1.7 Theoretical Framework Adopted in the Study

For any object of study as complex and polymorphous as “The impact of Agile methodology on technology projects' success,” any scientifically sound approach aimed at understanding and explaining this relationship has to start from a solid theoretical basis. This base enables

the researcher to keep in mind the main variables, propose testable hypotheses, and interpret the findings in an organized and meaningful manner.

As this study is focused not on defining Agile as a methodology, but on its real impact and efficiency, it is based on contemporary administrative theories and a number of administrative models, which seek to clarify the organizational behavior in a changing dynamics within the wide area of work environment, and to explain the trajectory of how the managerial practices and the choices are related to the output of a project.

1.7.1 Overall Theoretical Approach—Adaptation and Flexibility Given the importance of diversity and contextual factors, we have adopted an emergent or "best fit" approach to research.

Underpinning this research is the assumption that technology projects take place in uncertain and volatile conditions. Such settings demand dynamic rather than static or rigid management strategies. Hence, the research employs the notion of Adaptive Methodologies that is hostile towards bureaucracies, fosters ongoing socialization, and encourages learning via experiment and evolution. This attitude is well in line with the philosophy and principles of Agile.

1.7.2 Dominant Theories on the Relationship between Agile and Success

A. Open Systems Theory

It assumes that all organizations or projects are open systems that are continually interacting with an environment outside of themselves such as clients, markets, technical resources, the

macro-environment itself, and organizational context. Unlike a closed-system view, in which the organization is viewed as a system operating as if within a bottle, open systems are seen as flexible and responsive to change, to grow, and adapt over time, and do not construe organizations as operating within a barrier.

Why was it selected?

It's because Agile was built from the ground up to react to external changes — with such tools as the daily standup-, the reprioritization of the backlog, and the ongoing feedback loop from stakeholders. In other words, Agile is just a manifestation of open Systems Theory

B. Contingency Theory

This theory highlights that there is no one optimal manner to control all the projects. The specific content of all such methods can be expected to be context dependent, e.g. :

- The nature of the project
- The size of the team
- The complexity of the product
- The level of managerial support
- The organization's internal culture

Why was it adopted?

Because it explains why Agile works in your company, but doesn't in the next one—even-if both talk about following the framework. If an organization treats Agile as a dogmatic methodology it will rarely get any benefits, if however the culture is established to support it then usually success follows from that.

C. Agile Maturity Model

In contrast to classic theories, the Agile Maturity Model is a methodology for measuring how far an organization has progressed in its adoption of Agile. It categorizes organisations into various levels, which are:

- Initial and unstructured adoption
- Partial and isolated implementation
- Functional integration
- Complete organization change (Agile mindset and way of working)

Why was it chosen?

As plenty of these companies are saying we're doing Agile but they are not past the early stages. Agile maturity measurement makes it possible to appreciate the gap between Agile as described and how it is likely to be deployed in practice.

1.7.3 How These Theories Guided the Structure of the Research

The chosen theories added to our study in several important aspects:

a. In constructing the theoretical framework:

By untangling the interplay of environment, method, and organization.

b. In developing the research hypotheses:

For instance: “The more your Agile implementation has matured, the greater the chance you have for it to be successful in the given project.

c. For the development of the research instrument (questionnaire):

The items were designed to assess:

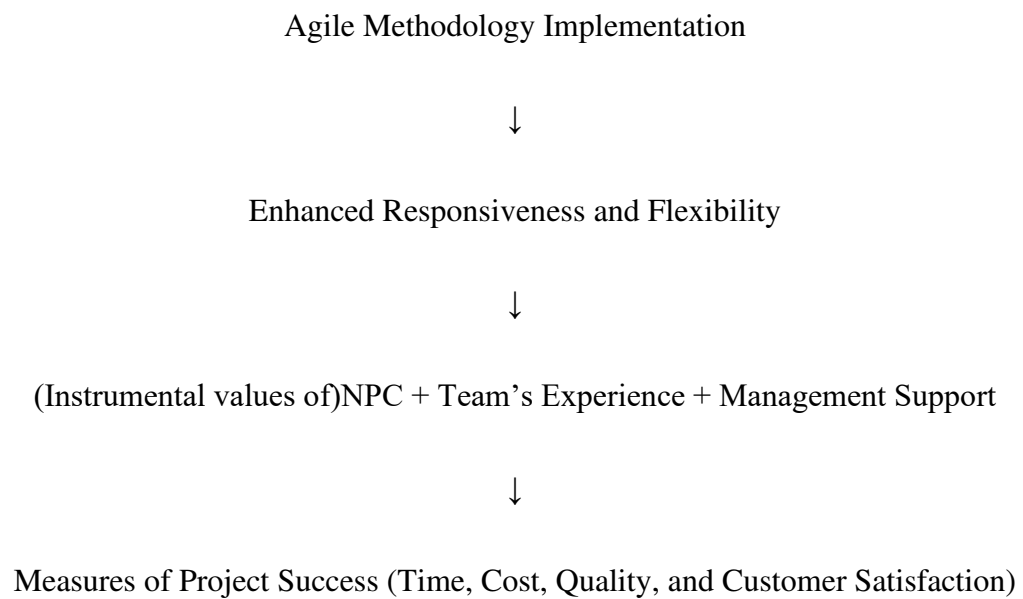
- Environmental responsiveness (Open Systems Theory)
- Relevance of Agile in context (Contingency Theory)
- Level of organization maturity (Agile Maturity Model)

d. In analyzing the results:

These theories will be used as lenses to explain why certain initiatives succeed and others fail when following similar agile methodologies.

1.7.4 Conceptual Model of the Study

According to the theoretical discussion above, the study develops a conceptual model to demonstrate the interrelationships of the important ORV variables herein.



Chapter Two

Previous Studies

2.1 Introduction

Managing technology projects is more difficult than ever during the era of digital transformation with need to constantly update your products, get products available to market quicker, innovative faster and faster, and keep up with fast changing customer expectations. These circumstances have questioned the suitability of traditional project management techniques to be applied and Agile methods have become prevailing means⁹.

Agile provides a flexible approach that acknowledges constant change and uncertainty by promoting teamwork, prototype-based development, and direct customer inputs. In contrast to classical approaches, Agile promotes a flexible process, realized by short-term work cycles (sprints), constant customer integration as well as continuous learning and improvement.

This chapter introduces the literature review on Agile in software technology project success. The aim is to lay a solid theoretical ground on why Agile makes projects succeed and in which contexts the most value is attainable. It investigates the historical development of project management strategies, main elements of Agile, contrasts between traditional approaches and Agile, and evidence about the use of Agile in global and as well as Arab industrial practices. The review also recognises the gaps in existing research and the theoretical frameworks employed to inform this study.

⁹ PMI. (2021). Pulse of the Profession 2021: Beyond Agility. Project Management Institute.

2.2 Researches on the Influence of Agile Implementation on Project Performance and Project Success

Recently, Cucolas and Russo (2021) studied the effects of telecommuting on the effectiveness of Scrum projects—one of the most popular Agile methods. The study was a mixed-methods approach that combined qualitative interviews with a quantitative survey of

200 remote software developers. They found Agile practices, such as daily stand-ups, and iterative reviewing played a positive mediating role in the transition to remote working. In addition, three psychological conditions—autonomy, competence and relatedness—were found to foster the effectiveness of Agile in such environments. While the researches was limited to software development teams, its results support the general understanding that Agile effectiveness is closely related to the organization and psychological environment, which test against the principle that situational and mediating factors are significant in the effectiveness of Agile.¹⁰

2.3 Studies Exploring the Link Between Agile and Digital Transformation in Industrial Organizations

Case study: High Tech Manufacturing Companies according to the Model of Digital Transformation Rashwan and Saad (2022) provide a case study in an enterprise of the manufacturing sector operating internationally in Egypt and investigated how Agile project management can contribute to organization performance and readiness for digital transformation. Agile adoption and performance This study found that Agile adoption led to the increase in rate of delivery, on-budget delivery and responsiveness to business/digital

¹⁰ Cucolaş, A.-A., & Russo, D. (2022). The impact of working from home on the success of Scrum projects: A multi-method study. *Journal of Systems and Software*, 197, 111562.

pivots. The report also noted a link between Agile tools –like Product Backlogs and Sprint Planning—and the organization’s readiness to accept the challenge of digital transformation.

This research is particularly significant as one of few pieces of work that investigates the context of Agile in industry outside software development. So it is a very useful basis for considering similar situations, like the Alfamar one. However, the present study had limitations, such as the single case approach that could limit the generalization of the findings.¹¹

2.4 Studies on the Role of Teamwork Quality in Large- Scale Agile Project Success

In a wide spread quantitative study Dingsøyr et al. (2024) were examined to study the relationship between team work quality and performance of Agile projects. The sample comprised 196 individuals from 34 teams involved in complex Agile projects. The results indicated that collaboration and communications models that may be puissant in a small group context do not immediately translate into larger projects because of different team dynamics manifests and organizational constraints.

This research is of particular value because it deals with large scale projects such as Alfamar’s. It calls out the reality that Agile practices must be tailored to project and environment instead of being blindly applied in a one-sized fits all manner.¹²

¹¹ Rashwan, M. F., & Saad, M. (2022). Agile project management implications to organization’s performance and readiness for digitalization. *Journal of Business and Management Sciences*, 10(4), 233–246.

¹² Dingsøyr, T., Schneider, P., Bergersen, G. R., & Lindsjörn, Y. (2024). Challenges in understanding the relationship between teamwork quality and project success in large-scale Agile projects. In *Proceedings of the 2024 IEEE/ACM 17th International Conference on Cooperative and Human Aspects of Software Engineering (CHASE)*

2.5 Field Studies from Saudi Arabia on Agile in Technology Projects

This study examined the application of Agile methodology in the NEOM project, one of Saudi Arabia's most ambitious and technologically advanced projects. Researchers combined interviews with quantitative data and examined the impact of Agile methodology on project quality and timelines. Their results showed that Agile facilitated error-free delivery in shorter timeframes with adequate management support and professional training.

The significance of this research lies in its geographical scope, as we explore a culture and bureaucracy almost identical to those at Alfannar. This research demonstrates that Agile success in the Saudi context is not limited to tools and practices alone, but also to organizational culture and leadership support.¹³

2.6 Research Gaps

Despite the increasing research in Agile method, this review exposes two critical shortcomings:

- The absence of an applied field Arab study that links Agile adoption with performance impacts in industrial / non-software settings.
- Inadequate analysis of control variables -mediators particularly managerial support and organizational maturity- and their impact on Agile effectiveness. Thus it is the aim of the current work to at least provide an empirical study in the specific context of the industrial context of the kingdom of Saudi Arabia (Alfannar), and allowing to have more insight on the real impact of agility.

¹³ خرمي، س.، مجردي، ر.، محمد، أ.ف.، وجراد، ف. (2024). أثر تطبيق منهجية أجايل في إدارة المشاريع على جودة الأداء ومدة التنفيذ في مشروع نيوم. المجلة الدولية للبحوث العلمية، 3(8)، 1189–1224.

2.7 Evolution of Project Management Approaches

There is no one-size-fits-all approach to ensuring the success of your project. In today's rapidly changing world, it is neither realistic nor desirable to develop a one-size-fits-all project management methodology. More companies are eschewing teamwork strategies

Agile software is now an effective project management methodology, particularly in software development¹⁶. Previous studies have demonstrated Agile's success in software projects¹⁷¹⁸, but the application of Agile in non-software fields is relatively recent. Studies in this area have been relatively limited in scope and scale, generally based on specific geographical or industrial settings¹⁹²⁰.

¹⁴ Young, L., Ganguly, A. and Farr, J.V. (2012), "Project management processes in agile project environment", 33rd Annual International Conference of the American Society for Engineering Management 2012, ASEM 2012 - Agile Management: Embracing Change and Uncertainty in Engineering Management, Virginia Beach, VA; United States, pp. 9-19.

¹⁵ Serrador, P. and Pinto, J.K. (2015), "Does Agile work? - A quantitative analysis of agile project success", International Journal of Project Management, Elsevier APM and IPMA., Vol. 33 No. 5, pp. 1040-1051.

¹⁶ Sweetman, R. and Conboy, K. (2018), "Portfolios of agile projects: a complex adaptive systems' agent perspective", Project Management Journal, Vol. 49 No. 6, pp. 18-38.

¹⁷ Beninato, S. (2001), "The secret to software success CIO", available at: <https://www.cio.com/article/2441472/the-secret-to-software-success.html> (accessed 09 June 2018).

¹⁸ Larman, C. (2004), Agile and Iterative Development: A Manager's Guide, Addison-Wesley, Boston, MA.

¹⁹ Lappi, T., Karvonen, T., Lwakatare, L.E. and Kuvaja, P. (2018), "Toward an improved understanding of agile project governance: a systematic literature review", Project Management Journal, Vol.19 No. 6, pp. 39-63.

²⁰ Nierman, F., Lechler, T. and Petit, Y. (2018), "A research agenda for extending agile practices in software development and additional task domains", Project Management Journal, Vol. 49 No. 6, pp. 3-17.

However, the suitability of Agile methodology compared to traditional approaches in various projects remains controversial. Furthermore, some researchers believe that Agile methodologies lack the rigor of traditional approaches, while others claim that the Agile process is more flexible and responsive²¹. There has been a slow introduction of empirical comparisons to distinguish between these perspectives²².

For example, Serrador and Pinto demonstrated the relationship between Agile adoption and project success through a robust empirical study. Their results indicate that higher levels of Agile adoption significantly impacted project success, particularly with regard to efficiency and stakeholder satisfaction. However, they did not compare Agile to other methodologies, such as traditional or hybrid approaches.²³

Expanding on this effort, researchers conducted a comparative study of traditional, agile, and hybrid methodologies. They found that agile and hybrid methodologies were more successful in meeting stakeholder expectations. However, the three methods achieved similar results in terms of coverage, quality, budget, and time. These findings highlight emerging phenomena in project management methodologies, and the trend toward a preference for adaptive hybrid approaches, tailored to individual project scenarios.²⁴

²¹ Vinekar, V., Slinkman, C.W. and Nerur, S. (2006), "Can agile and traditional systems development approaches coexist? An ambidextrous view", *Information Systems Management*, Vol. 23 No. 3, pp. 31-42.

²² Ahimbisibwe, A., Cavana, R. and Daellenbach, U. (2015), "A contingency fit model of critical success factors for software development projects: a comparison of agile and traditional plan-based methodologies", *Journal of Enterprise Information Management*, Vol. 28 No. 1, pp. 7-33.

²³ Serrador, P. and Pinto, J.K. (2015), "Does Agile work? - A quantitative analysis of agile success", *International Journal of Project Management*, Elsevier APM and IPMA., Vol. 3. pp. 1040-1051.

²⁴ Gemino, A., Reich, B.H. and Serrador, P.M. (2020), "Agile, traditional, and hybrid approaches to project success: is hybrid a poor second choice", *Project Management Journal*, Vol. 52 No. 2 pp. 161-175.

2.8 Moderators on the Relationship Between Project Management Approach and Project Success

Numerous research works have demonstrated the advantages of using Agile methodology to achieve a successful project, and its association is not always easy to understand. The efficiency of any project management methodology, either Agile or Traditional, is mostly determined by a lot of contextual and environmental factors. These parameters may attenuate the correlation between the selected method and the project success. It is important to understand these moderating factors in order to flesh out when and how Agile practices work (or do not work), particularly for a variety of industrial and technological contexts like the one found in Alfamar Company.

2.8.1 Industry and Project Type

Each industry has different project management needs based on:

- The type of work it undertakes
- The regulatory bodies it is subject to
- The customer expectations it is subject to
- The extent of its innovation. For example, IT projects are often subject to different constraints and must address a faster rate of innovation than non-IT industries.

Rolstadas et al. and Collier et al. argue that the industrial sector in which a project is implemented influences the amount of planning required and its impact on project success. Therefore, the type of industry is an important mediator in this relationship.²⁵²⁶

²⁵ Rolstadas, A., Tommelein, I., Schiefloe, P.M. and Ballard, G. (2019), "Understanding project success through analysis of project management approach", *International Journal of Managing Projects in Business* Article Information, Vol. 7 No. 4, pp. 638-660.

²⁶ Collyer, S., Warren, C.M.J. and Stevens, C. (2010), "Aim, fire, aim - project planning styles in dynamic environments", *Project Management Journal*, Vol. 41 No. 4, pp. 108-121.

The type of project (software or non-software systems development) can also influence the suitability of Agile practices. Agile methods are best suited for iterative software-based development projects where initial needs are less defined, and more traditional planning may be useful for engineering or infrastructure work. These differences justify the division of projects into: Information vs. Non-information Technology Projects.

2.8.2 Project Complexity and Technological Uncertainty

As technology becomes increasingly sophisticated, there is a need for more flexible and adaptive project management approaches, which is beneficial to the Agile approach. Highsmith notes that highly complex projects sometimes require traditional, structured project management to maintain control and predictability.²⁷

Serrador and Pinto also found that project complexity is a significant moderator for the impact of Agile on project success, which are for efficiency and stakeholder satisfaction²⁸. However, it was suggested that there may be a role for complexity in project cost and duration, as complexity might still be important in a context of technological uncertainty. A project may

require the team to be more adaptable if it involves high technological uncertainty, e.g. new or experimental technology.

2.8.3 The NTCP Model: A Comprehensive Framework

Shenhar Shnehar and his team are the developers of the NTCP framework, which identifies four critical aspects that differentiate projects and suggest when the different styles of project

²⁷ Highsmith, J. (2010), *Agile Project Management: Creating Innovative Products*, 2nd ed., Addison-Wesley, Upper Saddle River, NJ.

²⁸ Serrador, P. and Pinto, J.K. (2015), "Does Agile work? - A quantitative analysis of agile success", *International Journal of Project Management*, Elsevier APM and IPMA., Vol. 3 pp. 1040-1051.

management should be used^{29 30}. The following dimensions are treated as moderating factors when determining whether Agile approach is suitable for a project:

- Novelty: Relates to how new the product is to the market and customers. Projects may be categorized as:
 - Derivative (minor improvements),
 - Platform (moderate innovation), or
 - Breakthrough (entirely new concepts).
- Technology - Represents how much hardware technology is used. It ranges from:
 - Low-tech,
 - Medium-tech,
 - High-tech, to
 - Super-high-tech projects.
- Complexité – Décrit l'ampleur et le niveau de complexité dans un projet. A project can be as small as a simple log of some particular component or a massive system with dozens of components and parts connected to each other.
- Pace - Comments on urgency or the time meridian. Projects may be:
 - Regular (standard timeframes),
 - Fast/competitive (speed offers strategic advantage),
 - Time-critical (delays are unacceptable), or
 - Blitz (extremely urgent, crisis-like).

This NTCP model offers a practical idealized frame description to view or interpret what various project characteristics, if combined, would fit into Agile or traditional methods, less theoretically as in the OTCP argument.

²⁹ Shenhar, A.J. (2001), "One size does not fit all projects: exploring classical contingency domains", *Management Science*, Vol. 47 No. 3, pp. 394-414.

³⁰ Shenhar, A.J. and Dvir, D. (2007), *Reinventing Project Management: the Diamond Approach to Successful Growth and Innovation*, Harvard Business School Press, Boston, Massachusetts

2.8.4 Relevance to Alfamar Company

These moderating variables are particularly relevant in the case of Alfamar, which spans several sectors, such as electrical and construction and its peripheral IT services. For example, applying Agile in high-tech, software-based development teams may lead to different results compared with traditional manufacturing organizations. By the fact that Alfamar knows exactly the role that complexity, urgency, and technological uncertainty play in the relationship with project outcomes, the company can adapt its PMO and management style accordingly in a way that would assure them maximum success in their operations.

2.9 Comparison of Traditional, Agile, and Hybrid Project Management Approaches

Project Management Project management has undergone a major shift in the field over the past few decades. Formed in the 1950s around engineering principles, early paradigms focused on a structured, all-purpose approach to virtually any project, irrespective of size, or complexity. This yields to the proliferation of the conventional project management, it focuses on detailed planning, linear project work and clearly defined results.³¹

2.9.1 Traditional Project Management Approach

Traditional or “plan-driven” approaches are based on the premise that projects progress in a linear, sequential manner. These methods are adequate in a steady environment with well defined requirements and little customer involvement. Order Hierarchical planning and control are fundamentally essential, late-stage testing, and documentation Order is dominant.

³¹ Contorto. Mc. Kebenusch. k. and Amaral. Dc. 2014). Ine buummo blocks of Aomw as a leams Competence, Massachusetts Institute of Technology|Consortium for Engineering Program vxcelence (crre camonage Massachuseus

Although it is proven effective under certain circumstances, many companies face challenges when they apply the classical approach in fast-paced or changing environments. Its stiffness hinders flexibility, as in cases where new technology is being developed, the work changes quickly or customer demands change.³²

2.9.2 Agile Project Management Approach

As technology developed, particularly in IT and software, more flexible methods were required. A new set of values centered on collaboration, adaptability, and customer-centric delivery were described in the Agile Manifesto. Agile project management lays focus on iterative development, cross functional teams, and constant customer feedback³³

Agile approaches don't see change as the enemy but as well a agreed part of development. Projects are iterative in that planning and design always lead to constructing something, which then is tested before being modified. This flexibility renders Agile particularly appropriate to projects with ambiguous or quickly changing requirements.³⁴

³² Bergmann, T. and Karwowski, W. (2019), "Agile project management and project success: a literature review", in Kantola, JI, Nazir, S. and Barath, T. (Eds), *Advances in Human Factors, Business Management and Society*, AHFE 2018. *Advances in Intelligent Systems and Computing*, Springer, Cham, Vol. 783, pp. 405-414.

³³ Denning, S. (2013), "Why Agile can be a game changer for managing continuous innovation in many industries", *Strategy and Leadership*, Vol. 41 No. 2, pp. 5-11.

³⁴ Chen, Q, Reichard, G. and Beliveau, Y. (2007), "Interface management-a facilitator of lean construction and agile project management". 15th Annual Conference of the International Group for Lean Construction IGLC, Vol. 15, pp. 57-66.

2.9.3 Hybrid Project Management Approach

There's no one-size-fits-all answer to whether the conventional or agile approach is better. Therefore, companies have resorted to hybrid models, which include traditional foundation and clearness combined with responses of the Agile methodology³⁵. Hybrid methodologies enable companies to reap the benefits of Agile's speed and customer focus while preserving documentation, risk, and governance frameworks from ways of working from the past.

2.9.4 Comparative Analysis of Approaches

A comparison look at traditional and agile methods in comparison with various values of the project parameters are itemized in the table below. It demonstrates how each of these aspects varies in planning, team formation, customer contact, risk handling and flexibility.

Table 1: Comparison Between Traditional and Agile Project Management Approaches

Project Parameter	Traditional Approach	Agile Approach
Scope	Fixed and defined early	Emergent and changes rapidly
Planning Style	Plan-driven, sequential	Iterative, adaptive
Team Collaboration	Low; hierarchical	High; collaborative and cross-functional
Team Location	Distributed	Co-located
Management Style	Command and control	Leadership and facilitation
Customer Involvement	Minimal, mostly during planning and delivery	High, continuous involvement

³⁵ Cooper, R.G. (2016), "Agile-Stage-Gate hybrids", Research Technology Management, Vol. 59 No. 1,

Development Model	Linear or incremental	Evolutionary, time-boxed iterations
Requirements Handling	Fixed and negotiated early	Continuously evolving, prioritized by customer
Quality Control	Heavy testing at the end	Continuous testing and improvement
Organizational Structure	Bureaucratic, rigid	Organic, flexible, decentralized
Team Size	Larger teams	Small, dedicated teams
Communication	Formal	Informal and transparent
Knowledge Management	Explicit, documented	Tacit, shared through collaboration
Change Management	Resistant to change	Embraces change as core philosophy

This comparative treatment highlights the degree to which project context and features condition the appropriateness of a particular approach. Yes, more than 100% of Agile growth can be better than old models - While traditional approaches are best for well-defi... It is in this sense that today several organizations are resorting to the use of adaptive and context-specific models to be able to mold the methodology to the project needs and stakeholders' expectations.

2.10 Dimensions of Project Success

Projects vary greatly in complexity, uncertainly, their size, their length, the industry in which they occur to stakeholder values. Consequently, the notion of a successful project varies widely according to the type of project and the criteria upon which it is evaluated . There is

no definite, universally comprehensible definition of project success. As a result, there has been a proliferation of frameworks and models to reflect this heterogeneity of approaches ³⁶.

Traditionally, success of a project was focused mainly on the ‘iron triangle’ of time, cost and budget. Although these aspects are important for the assessment of effectiveness, they have been extended with a broader view of the definition towards more strategic -dimensional-effects of the research. Success has more and more recently been associated with long-term efficacy, organisational impact, and customer satisfaction³⁷

Stakeholders may vary in their perception of what constitutes success ³⁸. For example, what is considered a completed project for a client would also be considered a failure for the projects sponsor if the returns targets are not reached. As such, project success is today widely accepted to be a multidimensional concept, which is dependent on stakeholder’s perception, project environment, and time factors.

To address this complexity, Shenhar et al.³⁹ developed a holistic model for assessing five success aspects—ranging from immediate efficiency to strategy flow through. These dimensions include:

³⁶ Pacagnella, A.C., Da Silva, S.L., Pacifico, O., De Arruda Ignacio, P.S. and da Silva, A.L. (2019), "Critical success factors for project manufacturing environments", *Project Management Journal*, Vol. 50 No. 2, pp. 243-258,

³⁷ Albert, M., Balve, P. and Spang, K. (2017), "Evaluation of project success: a structured literature review", *International Journal of Managing Projects in Business*, Vol. 10 No. 4, pp776-821

³⁸ Shenhar, A.J. and Dvir, D. (2007), *Reinventing Project Management: the Diamond Approach to Successful Growth and Innovation*, Harvard Business School Press, Boston, Massachusetts.

³⁹ Shenhar, A., Levy, O. and Dvir, D. (1997), "Mapping the dimensions of project success", *Project Management Journal*, Vol. 28 No. 2, pp. 5-13.

1. Project Efficiency: A measurement of how well the project meets its time and budget objectives.
2. Impact of the Team: Increased team morale, development of skills, higher retention.
3. Customer Impact: Customer satisfaction, functional efficacy and practical usage of the product.
4. Business Success: The business results like profitability and market dominance.
5. Getting Ready For The Future: Innovation, New Technology And Strategic Positioning for Future Competitiveness.

This model is acknowledged as having gained popularity in project management literature because of its holistic nature and practical implementation⁴⁰. More holistic – It takes a more holistic view to a project's success beyond fulfilling operational objectives to achieving strategic value creation and long-term sustainability.

The five scopes with their associated criteria of evaluation are presented in the following table:

Table 2: Dimensions and Criteria of Project Success

Success Dimension	Evaluation Criteria
Project Efficiency	Meeting schedule goals; Meeting budget goals
Impact on the Team	Team morale; Skill development; Team member growth and retention

⁴⁰ Serrador, P. and Pinto, J.K. (2015), "Does Agile work? - A quantitative analysis of agile project success", International Journal of Project Management, Elsevier APM and IPMA., Vol. 33 No. 5, pp. 1040-1051.

Impact on the Customer	Functional performance; Technical specifications; Fulfilling customer needs; Satisfaction
Business Success	Commercial success; Market share; Product adoption; Generating revenue
Preparing for the Future	New technologies; New product lines; Strategic capability; Organizational innovation

2.11 Linking Project Management Methodology to Project Success

Recently, there has been growing interest in studying the relationship between project management methods and project success. Several studies have explored this relationship from different perspectives, all of which have confirmed that the type of methodology used potentially has a significant impact on project outcomes⁴¹⁴²..

Traditional project management methodologies, based on the idea that projects meet predetermined constraints in terms of cost, schedule, scope, and quality, appear inadequate to address the dynamics of contemporary projects. They assert that these methods lack the flexibility to respond to changes in customer requirements, market conditions, and technological complexity, which they see as occurring frequently.

⁴¹ Pacagnella, A.C., Da Silva, S.L., Pacifico, O., De Arruda Ignacio, P.S. and da Silva, A.L. (2019), "Critical success factors for project manufacturing environments", *Project Management Journal*, Vol. 50 No. 2, pp. 243-258.

⁴² Rolstadas, A., Tommelein, I., Schiefloe, P.M. and Ballard, G. (2019), "Understanding project success through analysis of project management approach", *International Journal of Managing Projects in Business Article Information*, Vol. 7 No. 4, pp. 638-660,

In contrast, agile project development techniques have gained significant traction due to their approach to delivery through iterations, continuous feedback loops, and strong customer involvement. There is empirical evidence for this pattern; Serrador and Pinto found a statistically significant relationship between the extent of Agile methodology implementation in projects and the degree of success achieved by stakeholders. Furthermore, their research demonstrated that Agile practices have a positive impact on project performance, such as budget, schedule, and scope targets.

Agile practices are, by their very nature, designed to accommodate higher levels of uncertainty and changing requirements. As Ahimbisibwe et al.⁴³ noted, iterative development reduces uncertainty and allows teams to move forward with feedback, which improves quality. In addition, close interaction with customers, a core value of the Agile methodology, has been reported to not only enhance the relevance of the solution but also mitigate the risk of scope and budget overruns.

Even with the many advantages of the Agile methodology, it is not a tool capable of eliminating all potential drawbacks. In some project contexts, particularly where strict regulatory requirements or lack of communication with customers exist, a more standardized process can be beneficial. This recognition has led to the development of hybrid project management methods, which combine practices from traditional approaches and Agile⁴⁴.

⁴³ Ahimbisibwe, A., Cavana, R. and Daellenbach, U. (2015), "A contingency fit model of critical success factors for software development projects: a comparison of agile and traditional plan-based methodologies", *Journal of Enterprise Information Management*, Vol. 28 No. 1, pp. 7-33

⁴⁴ Mohanarajah, S. (2015), "An improved adaptive and dynamic hybrid agile methodology to enhance software project", *Journal of Theoretical and Applied Information Technology*, Vol. 75 No. 3 pp.301-325

The hybrid methodology combines the stability of classic planning with the flexibility of Agile: it is particularly suitable for complex projects in high-tech or innovative environments. Gemino et al.⁴⁵ suggest that hybrid methodologies can go beyond agile or non-agile methodologies by providing greater flexibility without losing control. Their conclusion is consistent with the work of Serrador and Pinto⁴⁶ hybrid projects often experience higher stakeholder satisfaction and better execution performance.

Additional support for hybrid approaches comes from Conforto and Amaral⁴⁷, who investigated technology-based projects and found that hybrid models improve both project and product performance. Similarly, Sommer et al.,⁴⁸ who examined seven manufacturing companies in a multi-case study, concluded that hybrid methodologies led to enhanced team spirit and improved coordination, as well as better alignment between processes and methods.

Furthermore, Carvalho et al.⁴⁹ demonstrated significant productivity improvements with hybrid approaches, such as a 16% increase in overall project productivity, achieved by integrating the stringent management requirements of traditional approaches with the dynamics of Agile. These findings support the view of hybrid project management as a means

⁴⁵ Gemino, A., Reich, B.H. and Serrador, P.M. (2020), "Agile, traditional, and hybrid approaches to project success: is hybrid a poor second choice", *Project Management Journal*, Vol. 52 No. 2 pp. 161-175.

⁴⁶ Serrador, P. and Pinto, J.K. (2015), "Does Agile work? - A quantitative analysis of agile project success", *International Journal of Project Management*, Elsevier APM and IPMA., Vol. 33 No. 5, pp. 1040-1051.

⁴⁷ Conforto, E.C. and Amaral, D. (2015), "Agile project management and stage-gate model - a hybrid framework for technology-based companies", *Journal of Engineering and Technology Management*, Vol. 40, pp. 1-14.

⁴⁸ Sommer, A.F., Hedegaard, C., Dukovska-Popovska, I. and Steger-Jensen, K. (2015), "Improved product development performance through agile/stage-gate hybrids", *Research Technology Management*, Vol. 58 No. 1, pp. 34-44,

⁴⁹ Carvalho, M.M. De, Patah, L.A. and de Souza Bido, D. (2015), "Project management and its effects on project success: cross-country and cross-industry comparisons", *International Journal of Project Management*, Vol. 33 No. 7, pp. 1509-1522.

of combining the pursuit of stability with the necessity of flexibility, particularly in innovative contexts.

Based on previous studies, the study hypothesizes that Agile methodology, and hybrid methodologies for traditional project management, have a greater impact on project success than purely traditional methodologies. This theory informs emerging hypotheses and empirical research.

2.12 Critical Success Factors (CSFs) in Agile Projects

The effectiveness of Agile project implementation has been examined through various studies investigating the critical success factors (CSFs). Ojha has listed out some of these CSFs which includes organizational commitment, team competence, delivery approach, customer involvement, communication and Agile process maturity⁵⁰. In an extensive study by Chow and ,⁵¹ delivery approach, Agile engineering practices, and team capability emerged as the major determinants of project success in Agile context.

For technology based companies like Alfamar, the most important drivers are:.

- Supports from the top management. It provides an Agile enabling environment.
- The ability of the team, i.e. the appropriate skills, experience and knowledge in Agile ways of working.

⁵⁰ Ojha, A. (2023). Critical Success Factors for Agile Project Implementation: A Review of Recent Literature. Journal of Scientific and Technical Studies Nepal Engineering College, Pokhara University. ISSN NO. 2091-1742

⁵¹ Chow, T., & Cao, D. B. (2008). A survey study of critical success factors in Agile software projects. Journal of Systems and Software, 81(6), 961–971.

- Active participation of the users, so the product can be adapted to changes immediately, giving result in a more adjusted product to the user.
- Psychological safety and team autonomy which drive transparency, creativity, and agility.

They are also in line with the Agile Manifesto; in all three cases, people, interaction, and responsiveness are prioritized over processes and tools.

2.13 Theoretical Foundations Supporting Agile Methodology

Agile is not a stand-alone practice but is driven by several theories. Firstly, in consonance with Contingency Theory, it advocates that no one management style is suitable for all times but types of situations and that the best style depends on environmental and organizational factors⁵². Meanwhile, Agile is a great disruptor in both fluid, uncertain scenarios where flexibility is more critical than model construction.

Second, Lean Thinking, borrowed from the Toyota Production System, is also one of the main influences on Agile development. Both equally value elimination of waste, quick delivery and iterative learning⁵³. Agile, with its emphasis on providing working software early and frequently and doing away with non-value-adding tasks, mirrors lean.

⁵² Donaldson, L. (2001). *The Contingency Theory of Organizations*. Thousand Oaks, CA: Sage Publications.

⁵³ Poppendieck, M., & Poppendieck, T. (2003). *Lean Software Development: An Agile Toolkit*. Addison-Wesley Professional.

Third, Complexity Theory emphasizes the requirement of decentralized decision-making in complex and uncertain systems. Agile makes emergence and Responsiveness possible in these contexts by authorizing self-organizing teams ⁵⁴

Lastly, Behavioral Theory of the Firm, based on learning and adaptation through feedback loops, is also seen in Agile's sprint cycles and retrospectives. These systems allow ongoing improvement and rapid response to customer demands.

Collectively, these theoretical underpinnings contribute to the support of Agile as a solid, context-sensitive and empirically sound project management methodology.

2.14 Challenges of Agile Implementation in Large Industrial Contexts

Although there are many benefits to using Agile methodologies, if we attempt to implement them in large (large-scale) industries, which are typically characterized by bureaucracy, we will face many challenges.

Perhaps the biggest problem is bureaucratic intransigence. Long hierarchical structures within various companies may conflict with the decentralized, team-based nature of Agile⁵⁵.

⁵⁴ Highsmith, J. (2010). *Agile Project Management: Creating Innovative Products* (2nd ed.). Addison-Wesley.

⁵⁵ Conboy, K., & Carroll, N. (2019). Implementing large-scale agile frameworks: Challenges and recommendations. *IEEE Software*, 36(2), 44–50.

The second challenge lies in introducing existing processes and tools into organizations that operate with traditional or outdated reporting and control tools. This gap can lead to incomplete or unsuccessful adoption of Agile .Lack of experience and adequate training in Agile can also lead to a lack of understanding of what Agile means. Many teams mistakenly believe that Agile is merely a process framework, not a mindset change⁵⁶

Poor executive buy-in can also impact transformation processes. By adopting Agile methodologies without top-down support, initiatives fail to obtain the appropriate level of mandate or resources to achieve meaningful results⁵⁷ .

These challenges are exacerbated in Saudi Arabia by cultural factors that favor hierarchy, long-term planning, and formal communication styles. However, progressive entities such as Saudi Aramco have successfully implemented Agile by taking a contextual approach to tailoring practices to their specific circumstances, thus treating flexibility and control as interconnected elements.

2.15 Agile in the Saudi Arabian Context

2.15.1 Adoption Factors in the Saudi Software Industry

Factors affecting the adoption of Agile in software SMEs in Saudi Arabia were identified by Altuwaijri and Ferrario. Primary factors include: the national and organizational culture, the Agile teams level of skill, the customer's participation and the level of perceived complexity

⁵⁶ Boehm, B., & Turner, R. (2004). Balancing agility and discipline: A guide for the perplexed. Addison-Wesley Professional.

⁵⁷ Rigby, D. K., Sutherland, J., & Noble, A. (2018). Agile at Scale. Harvard Business Review, 96(3).

of projects. These results suggest that sociocultural fit is at least as critical as technical readiness.⁵⁸

2.15.2 Strategic Alignment with Vision 2030

In Saudi Arabia, Vision 2030 is in focus, and this lies on innovation, digital transformation, and smart cities, a perfect landscape for Agile project methodologies to flourish. Projects such as NEOM, the Red Sea Project, and widespread digitization in the public sector will need iterative, feedback-led and adaptive project structures, characteristics that are integral to Agile⁵⁹.

2.15.3 Case Study: Agile in Saudi Aramco

Agile: Hasan found that the adoption of Agile at Saudi Aramco led to improved project reactivity, transparency and customer satisfaction. Although there was initial reluctance and a heavily regulated setting, Agile cross-functional teams, through customised practices, namely Agile hybrids that combined waterfall and Scrum elements, achieved improved results.

This case demonstrates that well-understood and well-supported, Agile can work in one of the most industrial bureaucratic settings in Saudi Arabia.

Although this work is applied to Alfanar, however previous studies regarding Agile implementation in Saudi Arabia's large companies, such as Saudi Aramco (Hasan, 2025),

⁵⁸ Altuwaijri, F. S., & Ferrario, M. A. (2022). Factors affecting Agile adoption: An industry research study of the mobile app sector in Saudi Arabia. *Journal of Systems and Software*, 190, Article 111347.

⁵⁹ Hasan, A. Shakir. (2025). Adopting Agile Project Management at Saudi Aramco: Boosting flexibility and responsiveness

provide insight into the local ease of implementation and context specific challenges of Agile adoption.

2.16 Conceptual Framework and Research Model

According to the above literature, we set up the conceptual framework of the present study consisting of three categories of variables:

○ Independent Variable

Project management approach (Agile, Waterfall, Hybrid)

○ Dependent Variable

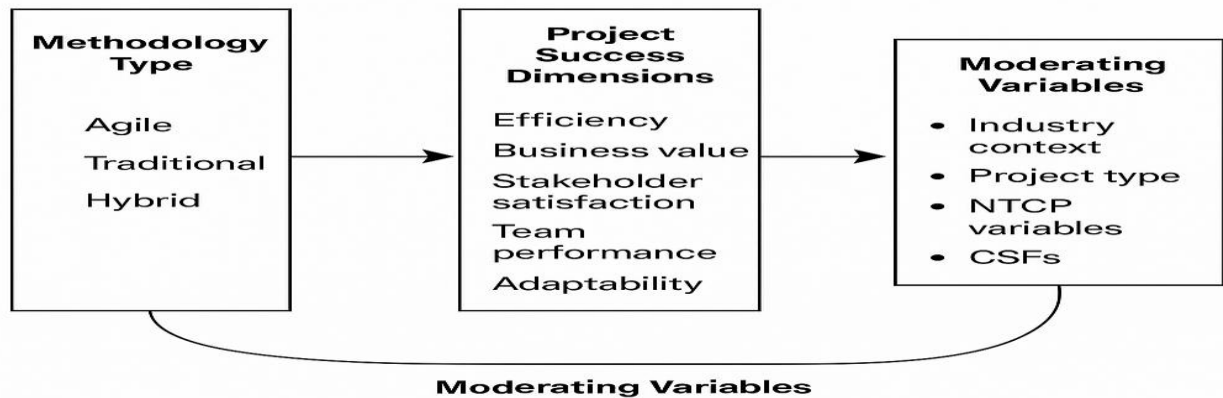
Project success, which can be appraised along a variety of axes (efficiency, business value, stakeholder satisfaction, team performance, and adaptability)

○ Moderating Variables

1. Context of industry (Information or Non-information technology)
2. Type of project (Software vs. Non-Software projects)
3. NTCP model elements (Novelty, Technology, Complexity, Pace) using the perspective of Shenhar and Dvir (2007).
4. Key success factors (e.g., team skills, customer participation)

❖ Visual Representation of Conceptual Framework:

Conceptual Framework



This framework facilitates empirical investigations of the effectiveness of Agile in different industries, types of projects, and internal enablers—something that make it very relevant to the case of Alfamar.

2.17 Summary of this chapter

This chapter extensively discussed the theoretical foundations that support the relationship between the importance of the Agile methodology and project success in a technological context. It began with a historical review of project management methodologies, focusing on the shortcomings of previous studies, and how the Agile methodology emerged from the need for rapid, responsive, and adaptable tools and techniques.

It also reviewed the essence of the Agile methodology and its focus on customer collaboration, which values agreements and contracts, adaptive planning, and RFP requirements that enable the routing of fixed bids. We encountered a misunderstanding of middle-level practices, which are essential when serving teams and in iterative development. Comparing Agile with traditional methodologies revealed the benefits of Agile in terms of

flexibility, responsiveness, and stakeholder engagement, for example, in software and technology organizations.

The chapter also explained the adoption of the Agile methodology and its impact on project success. Project success was explained in terms of efficiency (time and cost), customer satisfaction, business success, and long-term strategic success. The identification of critical success factors (such as team expertise, management support, and user involvement) and necessary conditions demonstrates that Agile quality is not innate, but rather depends on contextual enabling factors.

Second, the boundary conditions related to the relationship between Agile use and project outcomes are explained. Industry type, project complexity, project novelty, technical uncertainty, and project duration are shown to have significant influences, as demonstrated in Shenhar and Dvir's NTCP model. These aspects should guide the evaluation of success.

The chapter concludes with a brief introduction to the conceptual framework of the study, which brings together all the independent, dependent, and moderating variables and outlines the theoretical model for this study. The methodology and empirical analysis developed in subsequent chapters will build on this framework.

Chapter 3

Research Methodology

3.1 Introduction

Choosing the right research design is not only a formal face of view, but it is also at the core of the construction of a growing body of knowledge that must be accurate and useful in the organizational area. This is even more imperative when the research study attempts to investigate “The Impact of Agile Methodology on the Success of Sociology of Technology Projects” in its natural context of Alfanar

This study has an objective not only to examine the theoretical contribution of Agile practices, but also to test their practical impacts, including project deadline, budget management, product quality, and customer satisfaction. Thus, an appropriate methodology was cautiously chosen, based on descriptive and analytical approach that can lead to collection of numerical data and support to test hypothesis.

The quantified methodology used in this research set out to provide empirical assessments as to just how much (if at all) Agile plays a strategic part in the success or failure of technology-driven projects. The research through the statistical analysis wants to reveal trends, associations, correlations and possibly causation between the independent variable (Agile implementation) with the independents (project success indicators) and at the same time also to investigate the power determination of the mediators such as corporate culture, the support of the manager and the maturity of the team.

3.2 Type of Research and Design

This study is Entrepreneurial and applies a quantitative research based on a descriptive-analytical aresthetic. The approach -provides a straightforward way to measure, in an objective way, how agile adoption (independent variable) affects project success factors (dependent variables). It is best suited for starting to investigate how such agile practices as

Scrum, Kanban, sprints, stand-ups, iterative releases embody in reality and impact companies' performance measures.

3.3 Population and Sampling

The target population is professionals, managers, and technical staff working in the technology and project management departments of Alfamar. Specifically, the research focused on

- Project Managers
- Product Owners
- Members of Scrum
- Developers and QA staff
- IT Consultants/Agile Coaches (if available)

Participants were selected through purposive sampling based on their experience with Agile. The sample size was 100 persons from different parts of the organization who are working on application development using the approach at Alfamar.

3.4 Data Collection Instrument

The main tool employed in this study was a semistructured online questionnaire translated to English. The questionnaire consisted of three major components, were designed based on validated models from the literature as follows:

- **Assessment of Agile Adoption**

(eg. Use of Scrum, Daily Stand-ups, Sprint Reviews, Product Backlog, etc.)

- **Project success measures**

(Time management, cost control, product quality, customer satisfaction)

- **External and intervening factors**

(Organizational culture, team size, management support, Agile maturity level)

The questionnaire was examined by experts for content validity. Cronbach's Alpha was used to determine reliability and all constructs has achieved a value above 0.70 which indicate a high level of internal consistency.

3.5 Data Collection Procedure

The survey was disseminated online via web-based survey tools (i.e., Google Forms or Microsoft Forms). It was then circulated internally within Alfamar to individuals appropriate for its consideration. A concise description of the study object and protection of data privacy was provided in the introduction. Participation was voluntary and anonymous. Data collection took place over a three-week period and response rates were tracked to meet target completion.

3.6 Data Analysis Techniques

Data collected were processed with SPSS statistical software and the following procedures, were used:

- Descriptive Statistics (mean, standard deviation, frequency)
- Pearson Correlation Coefficient to investigate associations among Agile practices and project success

- Simple and Multiple Regression Analysis to evaluate direct and indirect effects
- T-tests and ANOVA to highlight statistically significant differences between respondent groups with respect to role, experience, or department

These approaches facilitated strong, multi-informant interpretation of the impact of Agile on technology project success at Alfannar.

3.7 Study Boundaries

- Geographical area: The research is advertisement in the Saudi Arabia on Alfannar Company.
- Timing: All data was gathered during the second semester of the 2024/2025 school year.
- Range of Topics: This study concent rates on Agile methodology and did not incorporate other project management approaches such as Waterfall and PRINCE2.

3.8 Ethical Considerations

The research work followed all of the ethical principles. Participants were:

- Briefed about the study procedures and objectives
- Right to withdraw at any time
- Option for all participants and information was anonymized and confidential.

No individual identification was kept and all information was for academic use.

Chapter 4

Results and Discussions

1.1. Introduction:

This chapter presents the analytical procedures undertaken to examine the validity and reliability of the questionnaire used in the study. It also includes the analysis of the main sample to explore the status of the study variables using descriptive statistics such as means and standard deviations. Subsequently, the main and sub-hypotheses of the study were tested using inferential statistical techniques, particularly correlation and linear regression analysis, to assess the effect of Agile methodology on the success of technology projects.

1.2. Content Validity (Face Validity):

The initial version of the questionnaire was submitted to a panel of experts in the fields of project management, software development, and organizational behavior to evaluate the clarity and relevance of the items in relation to the study's objectives. The core aim was to measure the impact of Agile practices—including level of implementation, team collaboration, customer engagement, and organizational support—on technology project success, specifically in terms of time, cost, quality, and customer satisfaction. Based on the experts' feedback and suggestions, the researcher modified the wording and sequence of some items to enhance clarity and alignment with the study constructs. The final version of the questionnaire was therefore considered valid in terms of content and closely tied to the theoretical framework of "The Impact of Agile Methodology on the Success of Technology Projects."

1.3. Internal Consistency Validity:

To assess internal consistency, the correlation coefficient between each item and the total score of its corresponding domain was calculated. A higher correlation value indicates that the item accurately reflects the construct it belongs to.

Additionally, significance values (Sig.) were analyzed to determine whether the relationships were statistically meaningful or due to random chance. A significance level below 0.05 was taken to indicate a valid and statistically significant relationship between the item and its respective domain.

Axis 1: Agile Practices

The first dimension: Level of Agile Implementation

Questions	Correlation	Sig..
1. Our Agile processes are clearly defined and consistently followed.	**0.683	.000
2. We conduct regular retrospectives to reflect and improve our workflow.	**0.693	.000
3. Agile ceremonies (e.g., daily stand-ups, sprint reviews) are practiced regularly.	**0.588	.000
4. Agile tools (e.g., Jira, Trello, MS Planner) are effectively used in our projects.	**0.719	.000
*Statistically significant at the 0.05 level **Statistically significant at the 0.01 level		

The correlation values for Level of Agile Implementation range between 0.588 and 0.719, all significant at the 0.01 level. The strongest correlation was with the statement, “Agile tools (e.g., Jira, Trello, MS Planner) are effectively used in our projects” ($r = 0.719$), suggesting that proper use of Agile tools plays a key role in project success. The lowest correlation appeared in “Agile ceremonies (e.g., daily stand-ups, sprint reviews) are practiced regularly” ($r = 0.588$), indicating a moderate but important link with successful outcomes.

The second dimension: Team Collaboration & Communication

Questions	Correlation	Sig..
1. Agile has improved communication among team members.	**0.303	.002
2. Cross-functional collaboration is more effective in Agile teams.	**0.313	.001
3. Agile practices have helped in reducing conflicts within the team.	*0.235	.018
*Statistically significant at the 0.05 level **Statistically significant at the 0.01 level		

The correlation values for Team Collaboration & Communication ranged from 0.235 to 0.313, all significant at the 0.05 or 0.01 levels. The highest correlation was observed for “Cross-functional collaboration is more effective in Agile teams” ($r = 0.313$), reflecting the value of interdisciplinary teamwork. The lowest correlation was with “Agile practices have helped in reducing conflicts within the team” ($r = 0.235$), indicating a modest but relevant relationship.

The third dimension: Customer Engagement & Feedback

Questions	Correlation	Sig..
1. Agile enables frequent feedback from clients and stakeholders.	**0.284	.004
2. Stakeholder needs are more accurately addressed through Agile.	**0.343	.000
3. Agile allows better visibility into project progress for stakeholders.	*0.230	.021
*Statistically significant at the 0.05 level **Statistically significant at the 0.01 level		

For Customer Engagement & Feedback, correlation values ranged from 0.230 to 0.343, all statistically significant. The highest correlation was for “Stakeholder needs are more

accurately addressed through Agile” ($r = 0.343$), suggesting that Agile improves responsiveness to client needs. The lowest was “Agile allows better visibility into project progress for stakeholders” ($r = 0.230$), indicating a mild yet meaningful association.

The Fourth Dimension: Agile Enablement Support and Risk & Visibility

Questions	Correlation	Sig..
1. I received sufficient training to effectively apply Agile practices.	**0.363	.000
2. My team has access to Agile coaching or mentoring support.	**0.300	.002
3. There is a clear understanding of roles in our Agile environment.	*0.224	.024
4. Agile helps in managing project risks more proactively.	**0.423	.000
*Statistically significant at the 0.05 level **Statistically significant at the 0.01 level		

The correlation values in the Agile Enablement Support and Risk & Visibility dimension ranged between 0.224 and 0.423. The strongest relationship was found in “Agile helps in managing project risks more proactively” ($r = 0.423$), highlighting the importance of risk management in Agile environments. The lowest correlation was with “There is a clear understanding of roles in our Agile environment” ($r = 0.224$), reflecting a weaker but still significant impact.

The Fifth Dimension: Agile Enablement Support and Risk & Visibility

Questions	Correlation	Sig..
1. Our team is able to meet project deadlines more consistently with Agile.	**0.315	.001
2. Agile projects are more likely to stay within budget.	**0.307	.002

3. Our organizational culture supports continuous improvement.	*0.230	.021
*Statistically significant at the 0.05 level **Statistically significant at the 0.01 level		

Correlation values for Organizational Environment ranged from 0.230 to 0.315, with all results statistically significant. The strongest correlation appeared in “Our team is able to meet project deadlines more consistently with Agile” ($r = 0.315$), showing that timely delivery is positively influenced by Agile culture. The weakest correlation was for “Our organizational culture supports continuous improvement” ($r = 0.230$).

The second axis: Project Success:

Questions	Correlation	Sig..
1. Leadership is open to feedback and adapts to Agile values.	**0.425	.000
2. Some departments resist adopting Agile practices.	**0.354	.000
3. Agile practices are sometimes modified or compromised due to organizational pressure.	**0.347	.000
*Statistically significant at the 0.05 level **Statistically significant at the 0.01 level		

In the Project Success dimension, correlations ranged from 0.347 to 0.425, all significant at the 0.01 level. The highest correlation was found with “Leadership is open to feedback and adapts to Agile values” ($r = 0.425$), highlighting the vital role of adaptive leadership. The lowest was “Agile practices are sometimes modified or compromised due to organizational pressure” ($r = 0.347$), still reflecting a moderate and meaningful influence.

1.4. Reliability of the Questionnaire

- **Questionnaire Reliability Procedures**

Reliability is a critical factor in evaluating a questionnaire. It is assessed by measuring the stability of calculating internal consistency (e.g., Cronbach's Alpha).

Variable	N.	Cronbach's Alpha
Agile Practices	17	0.830
Project Success	3	0.721

The reliability of the questionnaire was assessed using Cronbach's Alpha coefficient. For the Agile Practices domain (consisting of 17 items), the Alpha value was 0.830, indicating a high level of reliability. For the Project Success domain (consisting of 3 items), the Alpha value was 0.721, which is statistically acceptable. These values suggest that the measurement tools used in the questionnaire have a good degree of internal consistency and can be reliably used for further analysis.

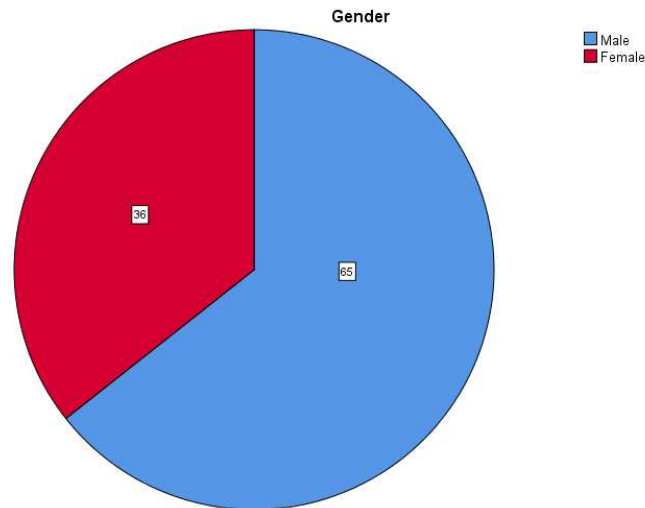
1.5. Descriptive Statistics for the Research Variables

- **Descriptive Statistics for Demographic Data**

The researcher presents, through the following tables, the characteristics of the research sample according to the demographic data (such as age, gender, Years of experience in IT/project management, and Current position).

The distribution of the research sample based on the gender variable:

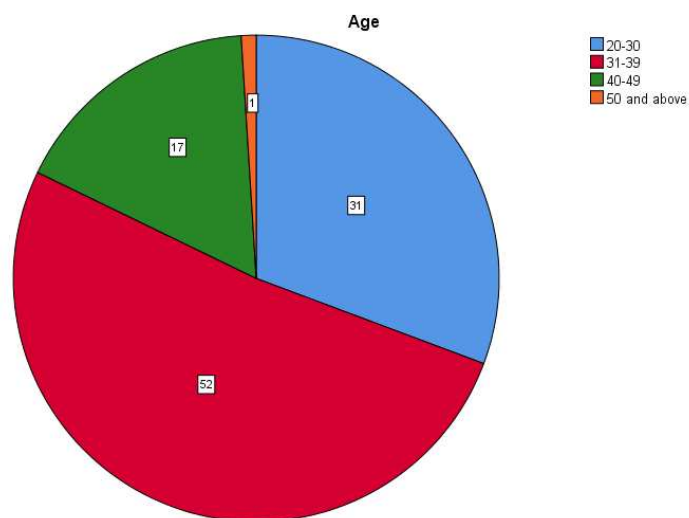
Variable	Levels of the Variable	Frequency	Percentage (%)
Gender	Female	65	64.4
	Male	36	35.6
Total		101	100



The results show that females made up 64.4% of the study sample, while males accounted for 35.6%. This indicates that the sample is predominantly female.

The distribution of the research sample based on the age variable:

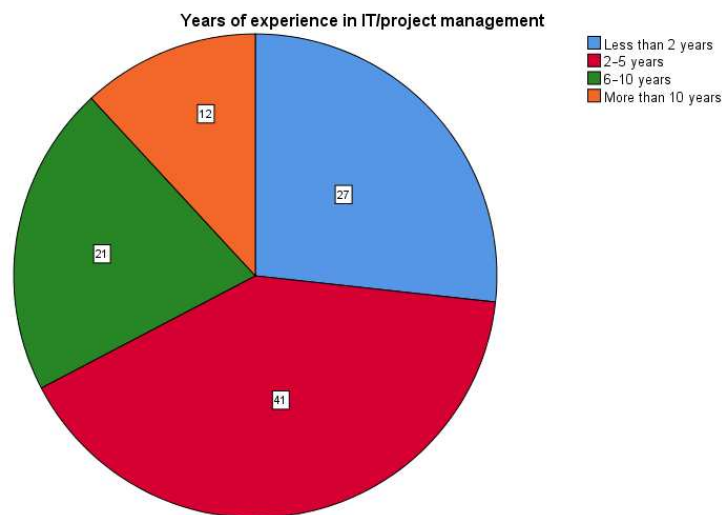
Variable	Levels of the Variable	Frequency	Percentage (%)
The age	20-30	31	30.7
	31-39	52	51.5
	40-49	17	16.8
	50 and above	1	1.0
Total		101	100



The data indicates that the 31–39 years age group was the most represented, comprising 51.5% of the sample. It was followed by the 20–30 years group at 30.7%, the 40–49 years group at 16.8%, and finally, the 50 and above group with only 1.0%.

The distribution of the research sample based on the Years of experience in IT/project management variable:

Variable	Levels of the Variable	Frequency	Percentage (%)
Educational Level	Less than 2 years	27	26.7
	2–5 years	41	40.6
	6–10 years	21	20.8
	More than 10 years	12	11.9
Total		101	100

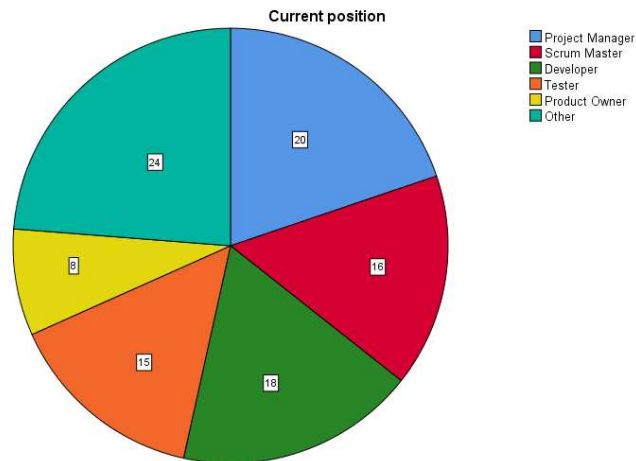


The findings show that 40.6% of participants had 2–5 years of experience, followed by 26.7% with less than 2 years, 20.8% with 6–10 years, and 11.9% with more than 10 years of experience.

The distribution of the research sample based on the Investment Experience variable:

Variable	Levels of the Variable	Frequency	Percentage (%)
Investment Experience	Project Manager	20	19.8
	Scrum Master	16	15.8

	Developer	18	17.8
	Tester	15	14.9
	Product Owner	8	7.9
	Other	24	23.8
Total		101	100



The results revealed a variety of current roles among participants. Those with “Other” roles represented the largest group at 23.8%, followed by Project Managers at 19.8%, Developers at 17.8%, Scrum Masters at 15.8%, Testers at 14.9%, and Product Owners at 7.9%.

- **Descriptive Statistics for Independent Variables**

Agile Practices

1. Level of Agile Implementation

Variable	Mean	Standard Deviation	Sig.	Rank
1. Our Agile processes are clearly defined and consistently followed.	3.62	.893	0.000	2
2. We conduct regular retrospectives to reflect and improve our workflow.	3.63	.659	0.000	1
3. Agile ceremonies (e.g., daily stand-ups, sprint reviews) are practiced regularly.	3.56	.684	0.000	4

4. Agile tools (e.g., Jira, Trello, MS Planner) are effectively used in our projects.	3.59	.802	0.000	3
Overall Mean	3.60			

The results indicate that participants positively assess the level of Agile practice implementation, with means ranging from 3.56 to 3.63. The highest mean was for conducting regular retrospectives to improve workflow (3.63), reflecting a good awareness of these practices. The overall mean of 3.60 suggests that Agile processes are well defined and consistently followed by the teams.

2. Team Collaboration & Communication

Variable	Mean	Standard Deviation	Sig.	Rank
1. Agile has improved communication among team members.	3.67	.694	0.000	2
2. Cross-functional collaboration is more effective in Agile teams.	3.59	.724	0.000	3
3. Agile practices have helped in reducing conflicts within the team.	3.71	.683	0.000	1
Overall Mean	3.66			

This dimension received the highest overall mean among the independent variables (3.66), with strong agreement on Agile's role in reducing conflicts within the team (3.71). This highlights Agile's effectiveness in enhancing collaboration and improving communication among team members.

3. Customer Engagement & Feedback

Variable	Mean	Standard Deviation	Sig.	Rank
1. Agile enables frequent feedback from clients and stakeholders.	3.62	.773	0.000	1

2. Stakeholder needs are more accurately addressed through Agile.	3.58	.778	0.000	2
3. Agile allows better visibility into project progress for stakeholders.	3.52	.729	0.000	3
Overall Mean	3.57			

Data shows participants recognize the importance of Agile practices in enhancing communication with clients and stakeholders, with means ranging from 3.52 to 3.62. The highest mean was for enabling frequent client feedback (3.62), underscoring Agile's role in better addressing customer needs.

4. Agile Enablement Support, Risk & Visibility

Variable	Mean	Standard Deviation	Sig.	Rank
1. I received sufficient training to effectively apply Agile practices.	3.48	.782	0.000	4
2. My team has access to Agile coaching or mentoring support.	3.49	.716	0.000	2
3. There is a clear understanding of roles in our Agile environment.	3.49	.657	0.000	2
4. Agile helps in managing project risks more proactively.	3.57	.698	0.000	1
Overall Mean	3.51			

This dimension had the lowest overall mean among the independent variables (3.51), yet it still reflects a satisfactory level. The highest mean was related to Agile's role in proactively managing project risks (3.57), while the lowest was for receiving sufficient training (3.48), indicating room for improvement in training and support.

5. Organizational Environment

Variable	Mean	Standard Deviation	Sig.	Rank
1. Our team is able to meet project deadlines more consistently with Agile.	3.60	.665	0.000	2
2. Agile projects are more likely to stay within budget.	3.56	.699	0.000	3
3. Our organizational culture supports continuous improvement.	3.66	.739	0.000	1
Overall Mean	3.61			

The overall mean for this dimension was 3.61, with positive ratings for organizational culture supporting continuous improvement (3.66). Participants also expressed satisfaction with the team's ability to meet deadlines and stay within budget, indicating a supportive environment for Agile adoption.

Project Success

Variable	Mean	Standard Deviation	Sig.	Rank
1. Leadership is open to feedback and adapts to Agile values.	3.50	.687	0.000	3
2. Some departments resist adopting Agile practices.	3.65	.623	0.000	2
3. Agile practices are sometimes modified or compromised due to organizational pressure.	3.70	.641	0.000	1
Overall Mean	3.62			

This category achieved an overall mean of 3.62. Participants noted some resistance in certain departments toward Agile adoption (3.65) and occasional compromises in Agile practices due to organizational pressure (3.70). However, there was relative satisfaction with leadership's openness to feedback and adaptation to Agile values (3.50), highlighting both challenges and opportunities for project success.

1.6. Gender Differences Analysis (Independent Samples Test):

This analysis aims to determine whether there are statistically significant differences between male and female participants regarding their perceptions of Agile implementation and project success. An Independent Samples t-test is used to compare the means between the two groups and assess whether gender plays a role in Agile adoption or project outcomes.

Variable	Sig. (2-tailed)	Results
Agile Practices	0.040	Significant
Project Success	0.051	Significant

The Independent Samples t-test results indicate a statistically significant difference between males and females in their perceptions of Agile Practices ($p = 0.040$), suggesting gender may influence how Agile implementation is viewed. However, the difference in perceptions regarding Project Success is marginally non-significant ($p = 0.051$), indicating that gender has little to no impact on views about project outcomes.

1.7. Age Group Differences Analysis (One-Way ANOVA):

This section investigates whether participants' age groups influence their views on Agile methodology and the success of technology projects. A One-Way ANOVA test is applied to compare the means across different age categories and to examine if age significantly affects Agile-related perceptions.

Variable	Sig. (2-tailed)	Results
Agile Practices	0.109	Not significant
Project Success	0.336	Not significant

The One-Way ANOVA results show no significant differences across age groups in relation to both Agile Practices ($p = 0.109$) and Project Success ($p = 0.336$). This suggests that participants' age does not significantly affect their perceptions of Agile methodology or project success in this study.

1.8. Years of experience in IT/project management Differences Analysis (One-Way ANOVA):

This analysis explores whether years of experience in IT or project management impact participants' evaluations of Agile implementation and project success. By using a One-Way ANOVA, the study compares responses across different experience levels to identify any significant differences.

Variable	Sig. (2-tailed)	Results
Agile Practices	0.05	Significant
Project Success	0.006	Significant

This analysis reveals statistically significant differences among participants with different years of experience regarding both Agile Practices ($p = 0.05$) and Project Success ($p = 0.006$). It indicates that experience level influences perceptions of Agile implementation and its success outcomes.

1.9. Current position Differences Analysis (One-Way ANOVA):

This part of the analysis assesses whether the participant's current job position (e.g., project manager, developer, system analyst, etc.) influences their perception of Agile practices and project success. A One-Way ANOVA test is conducted to identify differences in opinions among various job roles.

Variable	Sig. (2-tailed)	Results
Agile Practices	0.001	Significant
Project Success	0.009	Significant

The One-Way ANOVA test indicates significant differences in perceptions based on participants' current job positions for both Agile Practices ($p = 0.001$) and Project Success ($p = 0.009$). This suggests that the role held within the organization impacts how Agile and project success are perceived.

1.10. Hypotheses Testing

There is a statistically significant relationship between the adoption of Agile methodology and the success of technology projects in terms of time, cost, quality, and customer satisfaction.

Sub-Hypotheses:

1. **H1:** There is a statistically significant relationship between the degree of Agile adoption and the timely delivery of technology projects.
2. **H2:** There is a statistically significant relationship between the use of Agile methodology and improved control over project costs.
3. **H3:** There is a statistically significant relationship between the use of Agile methodology and customer satisfaction.
4. **H4:** There is a statistically significant relationship between the level of Agile maturity in an organization and the overall success of its technology projects.
5. **H5:** There is a statistically significant moderating effect of organizational culture on the relationship between Agile implementation and project success.
6. **H6:** There is a statistically significant relationship between management support and role clarity and the effectiveness of Agile implementation.

Results of Testing the First Main Hypothesis:

There is a statistically significant relationship between the adoption of Agile methodology and the success of technology projects in terms of time, cost, quality, and customer satisfaction.

Variable	Corrlation	Sig.
Agile Practices	0.762**	0.000
Project Success		

The results indicate a strong and statistically significant positive relationship between the adoption of Agile methodology and the success of technology projects, with a correlation coefficient of 0.762 and a significance level of 0.000. This confirms that implementing Agile practices positively impacts project success in terms of time, cost, quality, and customer satisfaction.

Results of Testing the Sub-Hypotheses:

1. **H1:** There is a statistically significant relationship between the degree of Agile adoption and the timely delivery of technology projects.

Variable	Corrlation	Sig.
Level of Agile Implementation	0.336**	0.001
On-Time Delivery		

The findings show a statistically significant positive correlation between the degree of Agile adoption and on-time delivery of technology projects, with a correlation coefficient of 0.336 and significance of 0.001. This suggests that higher levels of Agile implementation improve the team's ability to meet project deadlines.

2. **H2:** There is a statistically significant relationship between the use of Agile methodology and improved control over project costs.

Variable	Corrlation	Sig.
Level of Agile Implementation	0.324**	0.001
Cost Control		

There is a statistically significant relationship between the use of Agile methodology and better control over project costs, as indicated by a correlation of 0.324 and significance of 0.001. This reflects that Agile practices help teams manage budgets more effectively.

3. **H3:** There is a statistically significant relationship between the use of Agile methodology and customer satisfaction.

Variable	Corrlation	Sig.
Customer Engagement	0.718**	0.000
Customer Satisfaction		

The data reveals a strong and significant positive correlation between Agile adoption and customer satisfaction, with a correlation coefficient of 0.718 and a significance level of 0.000. This highlights the role of continuous customer engagement in Agile processes to meet client needs and increase satisfaction.

4. **H4:** There is a statistically significant relationship between the level of Agile maturity in an organization and the overall success of its technology projects.

Variable	Correlation	Sig.
Agile Maturity Level	0.430**	0.000
Project Success		

A statistically significant relationship exists between the level of Agile maturity within the organization and overall project success, with a correlation of 0.430 and significance of 0.000. This indicates that organizations with higher Agile maturity are more likely to achieve successful project outcomes.

5. **H5:** There is a statistically significant moderating effect of organizational culture on the relationship between Agile implementation and project success.

Variable	Agile Practices and Organizational Culture	Organizational Culture	Project Success
Agile Practices and Organizational Culture	1.000	.355 (p = .000)	.406 (p = .000)
Organizational Culture	.355 (p = .000)	1.000	.680 (p = .000)
Project Success	.406 (p = .000)	.680 (p = .000)	1.000

The triple correlation results show that organizational culture has a significant moderating effect on the relationship between Agile practices and project success. Correlation coefficients range from 0.355 to 0.680 with p-values of 0.000, emphasizing the crucial role that organizational culture plays in either supporting or hindering Agile implementation and project performance.

6. **H6:** There is a statistically significant relationship between management support and role clarity and the effectiveness of Agile implementation.

Variable	Correlation	Sig.
Management Support & Role Clarity	**0.430	0.000

Agile Implementation Effectiveness		
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The analysis indicates a significant positive correlation (0.430, $p = 0.000$) between management support and role clarity and the effectiveness of Agile implementation. This confirms that strong leadership support and clear understanding of roles greatly contribute to successful Agile adoption.

1.11. Simple Linear Regression Analysis

Effect of Agile Adoption on Technology Project Success: A Simple Regression Model

This analysis aims to examine the direct effect of Agile adoption (independent variable) on the success of technology projects (dependent variable). By using simple linear regression, we determine whether changes in the level of Agile practices significantly predict project success outcomes such as time, cost, quality, and customer satisfaction.

Variable	Unstandardized Coefficients (B)	Standard Error	Standardized Coefficients (Beta)	t-value	Sig.
constant	1.268	.327		3.880	.000
Agile Practices	.656	.091	.588	7.240	.000
ANOVA		Model Summary			
F	52.419	R	0.588		
Sig.	0.000	R Square	0.346		
		Adjusted R Square	0.340		

The simple linear regression results indicate a significant positive effect of Agile adoption on technology project success ($\beta = 0.588$, $p < 0.001$). The model explains approximately 34.6% of the variance in project success ($R^2 = 0.346$), confirming that higher levels of Agile practices are associated with greater project success.

1.12. Multiple Linear Regression Analysis

Combined Effects of Agile-Related Factors on Project Success: A Multiple Regression Approach

To gain a broader understanding of the factors contributing to project success, a multiple regression analysis was conducted. This model investigates the combined influence of multiple independent variables—including Agile adoption, Agile maturity, organizational culture, and leadership support—on the dependent variable: technology project success. The analysis helps identify which variables have the strongest predictive power and how they interact in influencing successful outcomes.

Variable	Unstandardized Coefficients (B)	Standard Error	Standardized Coefficients (Beta)	t-value	Sig.
constant	1.353	.336		4.024	.000
Level of Agile Implementation	.107	.085	.108	1.081	.036
Team Collaboration & Communication	.123	.081	.151	1.518	.002
Customer Engagement & Feedback	.255	.081	.349	3.152	.002
Agile Enablement Support, Risk & Visibility	.146	.081	.178	2.811	.003
Organizational Environment	.034	.057	.256	3.596	.002
ANOVA		Model Summary			
F	9.793	R	0.620		
Sig.	0.000	R Square	0.385		
		Adjusted R Square	0.345		

The multiple regression analysis shows that the combined factors of Agile implementation, team collaboration, customer engagement, Agile enablement support, and organizational environment significantly predict technology project success ($R^2 = 0.385$, $p < 0.001$). Among these, customer engagement and feedback have the strongest influence ($\beta = 0.349$, $p = 0.002$), followed by organizational environment ($\beta = 0.256$, $p = 0.002$). This model highlights the importance of multiple Agile-related factors working together to enhance project outcomes.

1.13. The Results:

1. There is a statistically significant relationship between the adoption of Agile methodology and the success of technology projects.
2. There is a statistically significant relationship between the degree of Agile adoption and the timely delivery of projects.
3. There is a statistically significant relationship between the use of Agile methodology and better control over project costs.
4. There is a statistically significant relationship between the use of Agile methodology and customer satisfaction.
5. There is a statistically significant relationship between the level of Agile maturity in the organization and overall project success.
6. There is a statistically significant relationship between organizational culture and the impact of Agile implementation on project success.
7. There is a statistically significant relationship between management support, role clarity, and the effectiveness of Agile implementation.
8. There is a significant positive effect of Agile adoption on technology project success.
9. There are significant effects of factors such as Agile implementation level, team collaboration, customer engagement, organizational support, and organizational environment on project success.
10. Customer engagement and organizational support have the highest significant impact on project success among the studied factors.
11. There are significant gender differences in perceptions of Agile Practices.
12. There are no significant age group differences in perceptions of Agile Practices or Project Success.
13. There are significant differences based on years of experience in perceptions of Agile Practices and Project Success.

1.14. The Recommendation:

1. The researcher recommends adopting Agile methodology to enhance technology project success.
2. The researcher recommends focusing on increasing the degree of Agile adoption to ensure timely project delivery.
3. The researcher recommends implementing Agile practices to improve project cost control.
4. The researcher recommends enhancing customer engagement within Agile processes to increase customer satisfaction.
5. The researcher recommends increasing Agile maturity within the organization to improve project success.
6. The researcher recommends developing organizational culture to support the impact of Agile implementation on project success.
7. The researcher recommends providing clear management support and role clarity to ensure effective Agile implementation.
8. The researcher recommends continuing Agile adoption due to its significant positive effect on technology project success.
9. The researcher recommends focusing on factors such as Agile implementation level, team collaboration, customer engagement, and organizational support to improve project success.
10. The researcher recommends strengthening customer engagement and organizational support due to their strong impact on project success.

Chapter 5

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Chapter 6

Appendix

Questionnaire Booklet

Section A: Demographic Information

Please tick (✓) the appropriate box.

1. Gender: ☐ Male ☐ Female
2. Age: ☐ 20–30 ☐ 31–39 ☐ 40–49 ☐ 50 and above
3. Years of experience in IT/project management: ☐ Less than 2 years ☐ 2–5 years
☐ 6–10 years ☐ More than 10 years
4. Current position: ☐ Project Manager ☐ Scrum Master ☐ Developer ☐ Tester
☐ Product Owner ☐ Other: _____
5. Department/Business Unit: _____

Section B: Agile Practices and Project Outcomes

Instructions: Please indicate your level of agreement with the following statements using the scale below.

5 = Strongly Agree 4 = Agree 3 = Neutral 2 = Disagree 1 = Strongly Disagree

No	Statement	1	2	3	4	5
B1	Our Agile processes are clearly defined and consistently followed.	☐	☐	☐	☐	☐
B2	We conduct regular retrospectives to reflect and improve our workflow.	☐	☐	☐	☐	☐
B3	Agile ceremonies (e.g., daily stand-ups, sprint reviews)	☐	☐	☐	☐	☐

	are practiced regularly.					
B4	Agile tools (e.g., Jira, Trello, MS Planner) are effectively used in our projects.	☐	☐	☐	☐	☐
B5	Agile has improved communication among team members.	☐	☐	☐	☐	☐
B6	Cross-functional collaboration is more effective in Agile teams.	☐	☐	☐	☐	☐
B7	Agile practices have helped in reducing conflicts within the team.	☐	☐	☐	☐	☐
B8	Agile enables frequent feedback from clients and stakeholders.	☐	☐	☐	☐	☐
B9	Stakeholder needs are more accurately addressed through Agile.	☐	☐	☐	☐	☐
B10	Agile allows better visibility into project progress for stakeholders.	☐	☐	☐	☐	☐
B11	I received sufficient training to effectively apply Agile practices.	☐	☐	☐	☐	☐
B12	My team has access to Agile coaching or	☐	☐	☐	☐	☐

	mentoring support.					
B13	There is a clear understanding of roles in our Agile environment.	☐	☐	☐	☐	☐
B14	Agile helps in managing project risks more proactively.	☐	☐	☐	☐	☐
B15	Our team is able to meet project deadlines more consistently with Agile.	☐	☐	☐	☐	☐
B16	Agile projects are more likely to stay within budget.	☐	☐	☐	☐	☐
B17	Our organizational culture supports continuous improvement.	☐	☐	☐	☐	☐
B18	Leadership is open to feedback and adapts to Agile values.	☐	☐	☐	☐	☐
B19	Some departments resist adopting Agile practices.	☐	☐	☐	☐	☐
B20	Agile practices are sometimes modified or compromised due to organizational pressure.	☐	☐	☐	☐	☐

Section C: Agile Implementation Challenges

11. What challenges have you faced in implementing Agile methodology?

- ☐ Lack of Agile training for team members
- ☐ Inconsistent Agile implementation across departments
- ☐ Resistance from senior leadership
- ☐ Lack of support from direct managers
- ☐ Limited authority given to Agile teams
- ☐ Too much bureaucracy or slow decision-making
- ☐ Difficulty aligning Agile with existing project governance
- ☐ Poor communication between business and IT
- ☐ Lack of dedicated Agile tools or platforms
- ☐ Challenges in managing remote Agile teams

Section D: Open-Ended Questions

12. In your opinion, what is the key factor that makes Agile successful in your organization?

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.....

13. What improvements would you recommend for Agile adoption at Alfamar or similar organizations?

.....
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The impact of Agile Methodology on the Success of Technology Projects

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