

**CAPITAL UNIVERSITY OF SCIENCE AND
TECHNOLOGY, ISLAMABAD**



**Agile Leadership and Project Success:
Sequential Mediation of Project Manager's
Competency and Employee Agility and
Moderated Mediation of Artificial Intelligence
Adoption**

by

Hamza Kiani

A thesis submitted in partial fulfillment for the
degree of Masters of Science

in the

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Department of Management Sciences**

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Abstract

Agile leadership (AL) is the prime managerial navigation for the adaptive organizations. The software and information technology sector increasingly operates in project-based environments where rapid technological change, shifting client expectations, and the diffusion of artificial intelligence require stronger leadership and adaptive capabilities. Drawing on Dynamic Capability Theory, this thesis examines how agile leadership contributes to project success (PS) through the sequential mediating roles of project manager competency (PMC) and employee agility (EA), and how artificial intelligence adoption strengthens selected capability-conversion relationships. A quantitative, deductive, explanatory, and a cross-sectional survey design was used. Agile leadership (AL) was measured as (IV), artificial intelligence adoption as Moderator, project manager competency (PMC) and employee agility (EA) as mediators, and project success (DV). The analysis followed SmartPLS-oriented PLS-SEM reporting logic, descriptive statistics, measurement model assessment, structural model assessment, mediation, moderation, and conditional indirect-effect analysis. The results showed positive and significant effects of agile leadership on project manager competency (PMC), employee agility (EA), and project success (PS). Project manager competency (PMC) and employee agility (EA) also had significant positive effects on project success (PS). Mediation analysis supported the indirect effects of agile leadership (AL) on project success (PS) through project manager competency (PMC), through employee agility (EA), and through the sequential path from project manager competency (PMC) to employee agility (EA). Moderation analysis indicated that artificial intelligence adoption (AIA) strengthened the relationship between agile leadership (AL) and project manager competency (PMC) and also strengthened the relationship between employee agility (EA) and project success (PS). The positive effects of agile leadership, agile competency of the project manager, and agility of the employee were reinforced by the conditional indirect effects, which were significant when AI adoption was high.

Keywords: Project Success, Agile leadership, Employee Agility, Project Manager Competency Artificial Intelligence Adoption, Dynamic Capability Theory, Software and IT industry, Islamabad.

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List of Acronyms

AI	Artificial Intelligence
AIA	Artificial Intelligence Adoption
AL	Agile Leadership
AVE	Average Variance Extracted
CMB	Common Method Bias
CR	Composite Reliability
DCT	Dynamic Capability Theory
EA	Employee Agility
IT	Information Technology
PMC	Project Manager Competency
PS	Project Success

Chapter 1

Introduction

1.1 Introduction

In a world of rapidly changing technology, a shortened timeframe, evolving customer expectations, and even greater competition, software and information technology companies are increasingly assessed on their capacity to deliver complex projects. In these contexts, project success is no longer solely based on “traditional planning, budgeting and control techniques” ([Faulconbridge and Ryan, 2026](#)). It also relies on dynamic organizational abilities: sensing environmental changes, taking advantage of new opportunities and reacting in time by reconfiguring human and technological resources. Agile leadership is therefore critical skill as it is about responsiveness, flexibility, speed of decision making, team orientation and readiness to change ([Mulongo, 2026](#)). The following behaviors are particularly important when working on software and IT projects where iterative delivery, client feedback and technology change is the usual scenario. The current study tries to look at the correlation between agile leadership and project success in the software/IT sector of Islamabad, Pakistan. It then provides an explanation for this relationship via two sequential mediators: project manager competence and employee agility ([Malik et al., 2023](#); [Wafa et al., 2022](#)). Project Manager Competency is the knowledge, experience, leadership, project-methodology awareness, and decision making capability needed to perform projects effectively. Agility is about how employees can embrace change, move between roles, continue to learn

new skills, apply new technology and collaborate well in teams. The introduction of the artificial intelligence adoption as a boundary condition is because the tools based on AI are being used increasingly in decision making, project planning, risk assessment, resource allocation, productivity and innovation in the software and IT sector. The model is based on Dynamic Capability Theory, where firms outperform in their performance by integrating, building and reconfiguring their competencies over time to adapt to evolving environments ([Daud et al., 2024](#); [Pauwels et al., 2026](#)).

1.2 Background of the Study

Over the last few years, project-based working has become the primary organizing principle in software and IT firms. In contrast to the ongoing management of a business operation, software projects must be managed and coordinated very consistently between key stakeholders such as: the project manager, software developers, QA team, business analysts, product owner, client, and technology vendor. Poor leadership, coordination, project manager capability, resistance to change and lack of workforce agility are common causes of failure in these projects. The problems are exacerbated in emerging economies due to resource limitations, evolving client needs, infrastructure uncertainty, skill shortages and inconsistent implementation of sophisticated technologies ([Ahmed, 2016](#); [Gemünden et al., 2018](#)).

Agile leadership is relevant because it helps to shift the paradigm of leadership from command and control to adaptive decision making, empowerment, quick communication and responsiveness to customer changes. Leaders are expected to foster a work environment in software projects that is conducive to innovation, experimentation and quick learning. But it is not enough to have leadership to ensure project success. It is crucial to translate agile leadership into project-level outcomes and outcomes through competent project managers and agile employees. While a leader can strive for speed and flexibility, competent project managers are essential to ensure effective resource management, and agile workers are necessary within project teams to ensure that they can meet changing requirements

(Chen et al., 2025; Langholf and Wilkens, 2021). According to Dynamic Capability Theory, AI adoption is effective in improving project performance only when it is accompanied by agile leadership and workforce capabilities (Jakobsson and Samimian, 2023; Mulongo, 2026).

1.3 Problem Statement

To effectively manage the growing complexity and expectations of customers with AI and deliver high-quality, innovative projects quickly, software companies are under greater pressure. Organizations that fail to develop agile leadership, competent project management, and agile employees are likely to experience delays, rework, scope creep, low stakeholder satisfaction, and weak project benefits (Kotlarsky et al., 2020).

In Pakistan, the IT sector has shown export growth and increasing policy attention, but the sector also faces challenges related to internet disruptions, client trust, talent retention, skill development, and operational reliability.

According to the 2024 report of PSEB the Board is the government body that has been tasked to promote Pakistan's IT industry by providing infrastructure, human capital, company capability, global marketing, strategy, research and innovation programs. This shows that the skills development is still the priority in the sector (Khanagha et al., 2022).

South Asian software and IT companies are facing competition in outsourcing at the regional level and clients demand fast delivery, quality, cyber security reliability and technological skills. There are four areas of competition regional firms must compete on not just on cost – but also speed, innovation, technical credibility and project governance (Vignarajah, 2025). The regional problem is most often, firms use agile and AI jargon without having the managerial and worker skills to integrate the tools into successful projects. This means that using AI could turn into a sound technological investment but fail to become a genuine dynamic capability (Aithal and AS, 2024; Arshad et al., 2024).

Nearly, software and IT companies are located near the policy institutions, universities, startups, public sector clients, and technology service providers in Islamabad. Nonetheless, there are some practical implications that still need to be addressed in the industry, including the variability in project-management maturity, AI integration effectiveness, reliance on skilled employees, and the inconsistencies in the implementation of agile in teams ([Bhatti et al., 2021](#); [Jakobsson and Samimian, 2023](#)).

Although Islamabad is an important IT hub, the following empirical knowledge is still limited in understanding the effect of agile leadership on the project success by project managers competency and employee agility; the adoption of AI as a technological boundary condition ([Kathuria et al., 2019](#)).

1.4 Research Gaps

The conceptual gap concerns the absence of an integrated capability-based model. The contextual gap concerns the limited empirical evidence from Islamabad-based software/IT organizations.

The theoretical gap concerns the need to align all variables under one theory rather than combining unrelated theoretical explanations. The methodological gap concerns the need for evidence in a field where many studies collect all variables in one questionnaire at one time ([Mirsharipova, 2026](#); [Raj et al., 2026](#)).

1.4.1 Theoretical Gap

Existing studies have examined leadership, workforce adaptability, and project performance separately; however, limited research has integrated Agile Leadership, Project Manager's Competency, Employee Agility, AI Adoption, and Project Success within a unified Dynamic Capability Theory framework ([Tominc et al., 2023](#); [Wijayarathne et al., 2026](#)). Furthermore, limited studies explain how Agile Leadership sequentially develops managerial competency and workforce agility to improve project success ([Tarigan, 2025](#)).

Moreover, existing studies have concentrated on traditional leadership models like transformational leadership, transactional leadership, and servant leadership and studies on Agile Leadership to date have been relatively few in number in the context of today's modern project management. Also, there is a lack of comprehensive explanation in the existing studies on how the managerial and workforce capabilities are sequentially developed in Agile Leadership to enhance the project performance (Uddin, 2025). Furthermore, there is a lack of theoretical research that examines how AI Adoption is a technological capacity to support leadership-driven organizational adaptation processes. The present study therefore builds on the theoretical lacuna by expanding Dynamic Capability Theory by examining the influence of strategic leadership capability, managerial capability, workforce adaptability, technological capability and project performance in a moderated sequential mediation model (Langholf and Wilkens, 2021; Siddiqui and Sareen, 2026).

1.4.2 Contextual Gap

From a practical standpoint, organizations still have important issues to address in the successful management of projects in fast changing, uncertain and technologically complex environments. With the greater investment in agile systems, and digital transformation programs, a huge number of organizations continue to suffer project delays, coordination issues, communication problems, human resource resistance to change, and low project adaptability (Dacre and Kockum, 2022).

Organizations continue to face project delays, coordination failures, workforce adaptability issues, and AI integration challenges despite adopting agile systems and digital technologies.

Existing literature provides limited practical guidance regarding how Agile Leadership and AI-supported environments collectively improve project success. Existing organizational processes are also lacking in providing knowledge about the impact of AI supported environments in enhancing leadership effectiveness and leadership capability strengthening processes (Dacre and Kockum, 2022; Nalavade, 2025). As a result, organizations are largely lacking practical advice on the synergistic effect

of the four key elements of Agile Leadership, managerial competency, employee agility and AI Adoption on project success. The current research thus aims to tackle this practical need by empirically analyzing the mechanisms required to build capabilities for success in project outcomes in contemporary organizational contexts enabled by AI ([Arroyo, 2026](#)).

1.4.3 Methodological Gap

Most previous studies have focused on simple direct relationships using conventional statistical techniques rather than examining complex mediation and moderation mechanisms simultaneously ([Nitzl et al., 2016](#)). Limited studies have used PLS-SEM to investigate moderated sequential mediation relationships involving Agile Leadership, AI Adoption, managerial competency, employee agility, and project success within a single framework ([Coutts and Hayes, 2023](#)). Second, most previous research has used traditional methods of regression analysis and simple statistical analysis without more sophisticated multivariate methods that can be used to explore complex structural relationships. There is little research that has adopted the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach to test PM moderated sequential mediation models that include the constructs of Agile Leadership and Project Success ([Coutts and Hayes, 2023](#)). This methodologically covers these gaps in the present study, which provides an advanced moderated sequential mediation model analyzed using PLS-SEM with SmartPLS 4 software. In addition to direct effects, sequential mediation, moderation and moderated sequential mediation effects are analyzed as part of a single empirical model that is based on Dynamic Capability Theory ([Awwad, 2025](#); [Schuler et al., 2025](#)).

1.5 Research Questions

- i. What is the effect of agile leadership on project success in software/IT organizations operating in Islamabad?

- ii. Does do project manager competency and employee agility mediate the relationship between agile leadership and project success?
- iii. Does artificial intelligence adoption moderate the relationship between agile leadership and project manager competency and the relationship between employee agility and project success?
- iv. Does the conditional sequential indirect effect of agile leadership on project success vary under different levels of artificial intelligence adoption?

1.6 Research Objectives

- i. To examine the direct effect of agile leadership on project success in Islamabad-based software/IT organizations.
- ii. To test the mediating roles of project manager competency and employee agility in the relationship between agile leadership and project success.
- iii. To examine the moderating role of artificial intelligence adoption in the agile leadership-project manager competency and employee agility-project success relationships.
- iv. To evaluate the conditional sequential indirect effect of agile leadership on project success through project manager competency and employee agility at different levels of AI adoption.

1.7 Significance of the Study

Theoretically, the study contributes to Dynamic Capability Theory by explaining project success as the outcome of linked capabilities rather than as a simple product of leadership behavior. Agile leadership represents a sensing and mobilizing capability; project manager competency represents the seizing capability that converts leadership direction into organized project execution; employee agility

represents the reconfiguring capability that allows people to adjust to new requirements and technologies; and AI adoption represents a technological capability that strengthens selected relationships ([Khan et al., 2023](#)).

In practice, the study offers software/IT managers, project managers, human resources professionals and policy makers guidance.

It proposes that fostering agile leadership practices, enhancing project manager skills, educating staff about agility, and integrating AI adoption into projects' processes can help increase the chances of success ([Hashem and Aboelmaged, 2025](#); [Mmieh Kwakye et al., 2025](#)).

It recommends the creation of agile leadership behaviors, project manager competencies, agile training for employees, and the adoption of AI in projects' processes, instead of it being a standalone investment in technology, to improve the chances of project success ([Allammari et al., 2025](#)).

1.8 Operational Definitions of Variables

1.8.1 Independent Variable Agile Leadership

Agile leadership refers to leadership behaviors that enable organizational responsiveness, flexibility, speed of decision-making, collaboration, empowerment, technological awareness, and change orientation Leadership behavior characterized by responsiveness, team orientation, technological awareness ([Jakobsson and Samimian, 2023](#)).

1.8.2 Mediating Variable Project Manager Competency

Project manager competency refers to the knowledge, experience, technical awareness, interpersonal skills, training, methodology awareness, team-building capacity, and decision-making capability that a project manager possesses to perform project activities effectively. It is distinct from agile leadership because it is role-specific rather than a generic leadership style. The project manager's project

knowledge, experience, tools-and-techniques awareness, interpersonal skills, leadership ability, and decision-making capability (Ghorbani, 2023; Rosamilha and da Silva, 2025).

1.8.3 Mediating Variable Employee Agility

Employee agility refers to the capacity of individual employees to adapt their behavior, skills, and collaboration patterns in response to changing work requirements.

It encompasses comfort with change, flexibility across tasks, proactive skill development, cross-functional collaboration, technological competence, and rapid adjustment to new environments.

Employee agility is conceptually distinct from both agile leadership (which is leader behavior) and project manager competency which is managerial capability (Naim et al., 2024; Rosamilha and da Silva, 2025).

1.8.4 Moderating Variable Artificial Intelligence Adoption

The extent to which an organization deploys and accepts AI and advanced technologies for strategic decisions, operations, products, services, and innovation. AI adoption is distinct from employee agility and project manager competency because it reflects organizational technological infrastructure rather than individual or role-specific human capabilities (Chen and Tajdini, 2025).

1.8.5 Dependent Variable Project Success

Project success is a multidimensional outcome construct encompassing time adherence, budget compliance, and overall project performance. It extends the traditional time, cost, and quality to include criteria such as client satisfaction, strategic alignment, and long-term value creation (Rizka Ibdyanti et al., 2024).

1.9 Organization of the Thesis

The thesis consists of five chapters. Chapter 1 introduces the study, problem statement, research gaps, research questions, objectives, significance, scope, definitions, and hypotheses. Chapter 2 reviews the literature and develops the theoretical framework using Dynamic Capability Theory. Chapter 3 explains the research methodology, including philosophy, design, sampling, measurement, data screening, and SmartPLS analysis strategy. Chapter 4 presents data analysis, measurement model assessment, structural model assessment, mediation, moderation, and hypothesis testing results. Chapter 5 discusses the findings, implications, limitations, recommendations, and conclusion.

Chapter 2

Literature Review

2.1 Introduction

This chapter conducts a literature review of agile leadership, project manager competency, employee agility, adoption of AI in projects and project success. Only Dynamic Capability Theory will be used as a theoretical basis. The chapter starts off by laying out the theory, followed by a conceptual and empirical differentiation of each of the variables. It then forms direct and indirect relationships, followed by sequential indirect and direct relationships and finally, moderating relationships. The aim of the chapter is to provide the theoretical separation of each construct, as well as to make it an empirical meaningful construct in its own right and to connect it to the proposed model in a logical manner.

2.2 Dynamic Capability Theory

The Dynamic Capability Theory is a theory that describes the process of internal and external competency integration, development and reorganization of the firms to cope with the dynamic environments. It is particularly valuable in sectors which are more technologically oriented as quality performance is not necessarily achieved merely through the use of conventional resources. The key is how well the organization can detect opportunities and threats, how they use their assets for

the opportunities, and how they adapt their assets to threats. In the software/IT industry, these attributes include agile leadership, project management skills, agile workforce, and AI-driven technological processes ([Cavusgil and Deligonul, 2025](#)).

In this thesis agile leadership is conceived as a sensing and mobilizing capacity. Agile leaders understand technological and market changes, establish appropriate working environment, give employees autonomy, promote rapid decision making, and promote flexibility ([Sun et al., 2024](#)). Project manager competency is a manifestation of a seizing mechanism as competent project managers turn leadership direction into project planning, coordination, conflict resolution, use of tools and team decisions. Agile employees are agile for reconfiguration: They change the way they work, how they collaborate, how they use technology and how they perform their duties when project needs evolve. Adopting AI is seen as a technological competency that can enhance the significance of leadership and agility through diverse ways, such as providing better decision support, monitoring projects, fostering innovation, and adapting to changes ([Cristofaro et al., 2025](#); [Quansah et al., 2022](#)).

2.3 Agile Leadership

Agile leadership is leadership behaviors which enable responsiveness, flexibility, speed, collaboration, empowerment, technological awareness and change orientation. It is not a traditional leadership style as it focuses more on speedy adaptation, decentralized decision making, responsiveness of customers and team learning. Agile leadership is not just about applying agile methodologies; it's a mindset, a way of thinking and acting, a skill set, a capability, and a team attitude that enables the computer software / information technology team to make meaning of the changing projects they are dealing with and quickly respond without losing the direction of the projects ([Ostadi et al., 2024](#); [Zahra et al., 2022](#)).

The agile leadership construct employed in the present study has been based on the scale logic of ([Kaya, 2023](#)), which consists of leadership behaviors such as technological change sensing, using technology-based communication, flexible planning,

developing team work, rewarding innovation, assigning the right person to the right job and strategic vision. Under DCT, these behaviors are leadership level sensing and mobilizing behaviors which make the organization ready to respond to technological turbulence and client needs ([Muduli and Choudhury, 2025](#)).

2.4 Project Manager Competency

Project manager competency is the project manager's knowledge, experience, technical awareness, interpersonal skills, training, methodology awareness, leadership, team building and decision making. It's different from agile leadership as it's not a generic leadership style. It is a project capability defined in terms of the role. It is a project capability that is role specific and it is a transformation of organizational direction into project direction. Although an agile leadership may exist at the organizational level and/or team level, the success of a software project still relies on the competency of PMs who can plan resources, manage conflicts, coordinate tasks, implement methods and tools and align stakeholders ([Alvarenga et al., 2020](#); [Ghorbani, 2023](#)).

Competencies for project manager from DCT point of view is a seizing one. While the agile leader may feel a sense of change, project managers will take advantage of opportunities to adopt methods, allocate resources, solve issues, and keep project teams moving in the direction of time, cost, scope and quality. As such, the project manager competency should moderate the link between agile leadership and project success ([de Rezende and Blackwell, 2019](#)).

2.5 Employee Agility

Agility of employees is their ability to feel comfortable in change, shift between jobs, acquire skills, work in cross-functional teams, feel comfortable with technology, adapt to new surroundings and actively gather information within the organization. It is different from project manager competency as it is more about how the workforce adapts to changes, whereas project manager competency is

about his or her ability to manage the project. It is also different from agile leadership as it is an employee level capability, as opposed to leadership behavior (Ahmadi Eftekhari et al., 2022).

The Workforce Agility scale developed by Muduli (2017) was modified to seven items and employee agility was measured with these items. This instrument originally assesses agility at the individual employee level, covering the abilities to adapt, be flexible, learn continuously, be technologically competent and respond to organizational change.

The construct in the present study is operationalized to be congruent with the study context, but with the same measurement items. By quickly learning, adapting efforts, teaching others and leveraging digital tools effectively, agile employees can mitigate the impact of changes to scope and technology uncertainty.

The agility capability of human resources is a reconfiguring capability in DCT, as it is the ability of human resources to change or recombine their skills in response to the needs of the projects (Ali et al., 2025; Tiong et al., 2026).

2.6 Artificial Intelligence Adoption

The term AI adoption is used to describe the process of implementing and integrating AI and other cutting-edge technologies in the organization for operations, strategic planning, product and service development and innovation generation.

There is no dependent variable for the use of AI in this thesis. On the contrary, it is a boundary condition which can be reinforced in the process of capability conversion. AI can assist in decision making, automate repetitive tasks, monitor projects, detect defects, aid documentation and plan using data. But, AI can't save the day if it's not used in conjunction with agile leadership and agile workforce skills (Gama and Magistretti, 2025; Wamba-Taguimdje et al., 2020).

AI adoption is distinct from employee agility and project manager competency. It reflects organizational technological capability, whereas employee agility reflects

human adaptability and project manager competency reflects role-specific managerial capability. In the proposed model, AI adoption strengthens selected relationships: agile leadership may be more likely to develop project manager competency when AI tools and technological routines are present, and employee agility may contribute more strongly to project success when AI adoption enables employees to apply their adaptability through advanced tools and information systems (Grover et al., 2022; Rane et al., 2024).

2.7 Project Success

Project success is multi-dimensional and encompasses time, cost, quality, scope, risk management, compliance, documentation, stakeholder satisfaction, reputation, beneficiary value, sustainability and success. The time, cost, and quality are considered the three constraints of traditional project management. The definition of success for projects is wider today, as it must meet stakeholders' need, deliver long-term benefits, align with strategic goals and add to the value of the organization and/or the community (Kuzior et al., 2023; Watema and Tulirinya, 2021).

In software / IT businesses, project success could be affected by leadership, competency, agility of the workforce, and technology adoption. Agile leadership can set the tone for responsiveness, capable project managers can convert the direction into disciplined execution, agile employees can adapt to evolving needs and the integration of AI can provide better decision support and streamline operations. Hence, the final result of the capability chain is considered as a project's success (Utomwen, 2024; Watema and Tulirinya, 2021). The differentiation in Table 1 deals with that variables need to be distinguished. Constructs are linked but not mutually exclusive. Agile leadership describes the agile behavior of the leader; project manager competency describes the way project managers work; employee agility describes how employees behave; AI adoption describes the context of the technology; project success describes the result the project delivers (Tiong et al., 2026; Watema and Tulirinya, 2021).

2.8 Variable Differentiation

TABLE 2.1: Differentiation among Study Variables

Comparison	Differentiation
Agile leadership vs. project manager competency	Agile leadership is a behavioral leadership capability; project manager competency is a role-specific managerial execution competency.
Agile leadership vs. employee agility	Agile leadership concerns leader behaviors; employee agility concerns employee adaptability and skill reconfiguration.
Project manager competency vs. employee agility	Project manager competency is managerial and coordination-oriented; employee agility is workforce-level adaptability and flexibility (Kryshko et al., 2023).
AI adoption vs. employee agility	AI adoption is technological and organizational; employee agility is human and behavioral.
AI adoption vs. project manager competency	AI adoption concerns the presence and use of intelligent technologies; project manager competency concerns knowledge, experience, tools, interpersonal skills, and decision-making ability.
Project success vs. all antecedents	Project success is an outcome construct, whereas agile leadership, project manager competency, employee agility, and AI adoption are capability-related antecedents or boundary conditions.

2.9 Theory Mapping under Dynamic Capability Theory

TABLE 2.2: Theory Mapping Based on Dynamic Capability Theory

Construct	DCT Role	Explanation
Agile Leadership	Sensing and mobilizing capability	Leaders detect environmental and technological changes and mobilize teams toward rapid response.
Project Manager Competency	Seizing capability	Project managers translate competencies direction into project decisions, methods, coordination, and resource commitments.
Employee Agility	Reconfiguring capability	Employees adjust skills, tasks, roles, technologies, and collaboration patterns according to changing project needs.
AI Adoption	Technological enabling capability	AI tools strengthen decision support, innovation, planning, monitoring, and the value of agility.
Project Success	Capability outcome	Successful projects indicate that sensing, seizing, reconfiguring, and technological capability have been converted into project performance.

2.10 Hypothesis Development

Agile leadership has the potential to increase project success since agile leaders foster a responsive workplace, promote innovation, allow for flexibility, leverage technology for communication, and are quick to act on changes in customer expectations. When it comes to DCT, it's about sensing and mobilization, getting the organization ready for successful project delivery. Hence, H1 is proposed that agile leadership has a positive impact on project success (Seraj et al., 2025).

TABLE 2.3: Hypotheses of the Study

Hypothesis	Statement
H1:	Agile leadership has a positive effect on project success.
H2:	Agile leadership has a positive effect on project manager competency.
H3:	Project manager competency has a positive effect on employee agility.
H4:	Employee agility has a positive effect on project success.
H5:	AI Adoption moderates the relationship between Agile Leadership and Project Manager's Competency such that the relationship becomes stronger when AI Adoption is high
H6:	Project Manager's Competency mediates the relationship between Agile Leadership and Employee Agility.
H7:	Project Manager's Competency and Employee Agility sequentially mediate the relationship between Agile Leadership and Project Success.
H8:	AI Adoption strengthens the indirect sequential effect of Agile Leadership on Project Success through Project Manager's Competency and Employee Agility.

Agile leadership should enhance the competency of project managers since leaders who foster learning, flexibility, quick decision-making and technology awareness

will provide conditions for project managers to learn, gain new knowledge and technology, understand how to handle conflicts and how to manage his/her team. Based on this understanding, H2 hypothesizes that agile leadership has a positive impact on project manager competency ([Bushuyeva et al., 2019](#); [Neto et al., 2022](#)).

The competencies expected of project managers should also improve employee agility by enabling them to manage teams, apply project methods, manage conflicts, coordinate resources and provide direction. So, the project manager competency has positive impact on employee agility in the project ([Sumadireja et al., 2025](#)).

Agile employee agility would be expected to help achieve project success as workers can adapt to evolving requirements, adapt to changing tasks, learn new technology, work cross-functionally and be productive in uncertainty.

For this reason, H4 suggests that agility of employees positively contributes to the project success ([Munawaroh et al., 2026](#)).

Project manager competency and employee agility are expected to mediate the agile leadership-project success relationship.

But agile leadership is not necessarily guaranteed to lead to project success without transforming leadership influence into the project-management skills of the individual and the adaptability of the team.

Hence, two mediation and sequential mediation effects are suggested by H6 and H7 ([Nayak et al., 2026](#)).

Selected relationships will be reinforced by AI. In contexts where the adoption of AI is high, agile leadership can be more meaningfully expressed as project manager competency, due to the better decision-support, information flow and technology routines offered by AI systems.

Likewise, the ability of employees to be agile can be more of a driver for project success when they can be put to good use with the help of AI tools. Therefore, H8: Mediation is needed (moderation mediation) and H5: Moderation effects ([Rumman and Hatamleh, 2025](#); [Varshney and Varshney, 2025](#)).

2.11 Agile Leadership as a Micro Foundation of Dynamic Capabilities

Agile leadership can be understood as a micro foundation of dynamic capability because it explains how sensing and mobilizing activities become visible at the human and team level. Dynamic Capability Theory argues that organizational renewal is not produced by resources alone; it depends on managerial routines and behavioral processes that allow firms to notice changes, interpret them, and respond before opportunities are lost (Khan and Kwan, 2025). Agile leaders perform a sensing function when they monitor technological changes, listen to customers, encourage experimentation, and keep project teams attentive to environmental signals (Syamsir et al., 2025).

The behavioral aspects of leadership in agile thus vary from the more traditional supportive leadership. The question of leadership is not only whether it is helpful or motivational but whether it establishes routines that enable speedy learning, adaptable prioritization and disciplined adaptation (Aliu et al., 2025). The adopted agile leadership scale in this thesis encompasses the behaviors of encouraging teamwork, constructing a creative work environment, communicating via technology, promoting flexible planning, assigning people to appropriate tasks, and celebrating innovation. These behaviors align with the sensing and mobilizing dimension of DCT as they equip project teams to deal with uncertainty rather than waiting for hard and fast rules or approvals to come later (Nareswari and Astuti, 2025).

Also, a capability-based interpretation helps to explain how agile leadership can impact project success in both direct and indirect ways. A direct effect is possible as agile leaders can cut the time taken to coordinate, speed up communication and keep teams in line with changing priorities (Aliu et al., 2025). But there is an indirect effect as well: Leadership behavior needs to be transformed into project enactment via project manager competence and employee agility. Agile leadership sets the stage for success, but competent managers and agile employees rely on their ability to translate that into a decision made in a timely fashion, flexibility

with tasks, satisfaction with the client, and quality of delivery ([Alqarni et al., 2023](#); [Verenych et al., 2022](#)).

2.12 Project Success in Software and IT Projects

Organizations that create software products are primarily project-driven. But, project failures are common in such project-driven environments.

Based on data from The Standish Group, only 31% of projects were successfully completed, 50% faced challenges in project development and 19% of projects failed ([Seppänen et al., 2025](#)).

The Cambridge Dictionary gives the definition of success as “the achievement of the desired or hoped-for outcomes” and “an accomplishment that is successful.”

This definition can be adapted and applied to context of projects. When it comes to the success of software projects, there are many factors to consider, and professionals in the technology industry are interested in learning about them.

The aim is to take these factors into account when managing projects and avoid project failure. Various studies have appeared in the literature that attempt to explain why some software projects are successful and others fail ([Jahangir et al., 2025](#)).

These key factors are called “critical success factors (CSFs)”. Software project failure is likely to occur if these events, conditions and circumstances (CSFs) are not handled appropriately ([Jalil et al., 2022](#)). Project success factors are independent variables that are factors in determining a project’s success. In addition, there is a difference between these variables and what is referred to as project success criteria – the indicators used to gauge the success or failure of a project. Many studies were conducted on the CSFs which affect the success of software projects, making them relevant to software development organizations given their direct relationship with the success of software projects ([Monserrat et al., 2025](#)).

The success of the project was defined as a multi-dimensional construct which included the time, budget, quality, scope, risk management, compliance, documentation, satisfaction of the stakeholders, sustainability, reputation and the overall project outcomes. This holistic perspective acknowledges that the success of software projects is more than just about their performance metrics, encompassing the multifaceted contributions of leadership, managerial skill, employee agility, and AI integration (Barros et al., 2024). Project success is viewed in Dynamic Capability Theory as the manifestation of organizational capabilities into project value, in this case project value in the hands of the project participants. A multidimensional measure also allows for a more comprehensive evaluation of project performance, and it can be used to consider a variety of stakeholders' expectations (Hans and Marebane, 2023).

2.13 Project Manager Competency as Conversion Mechanism

Another vital mechanism in making agile leadership manifest in project success is the project manager's competency. Agile leaders set a strategic direction, drive innovation and promote flexibility, but project managers take these strategic intentions and translate them into plan to manage resources, coordinate teams, manage risks, conflict and communicate with stakeholders (Zhang et al., 2025). In software and IT projects, the pace of technological advancements and the fluctuating demands of clients, combined with the uncertainty of projects, necessitate quick and informed decision-making, highlighting the importance of this role. Thus, competency of a project manager is the bridge between the direction of leadership and project execution (Zhang et al., 2025).

The project management literature is always clear that the successful project manager has a range of technical skills, leadership, communication and strategic decision making abilities. In addition to scheduling and budgeting, well-performing project managers manage multidisciplinary project teams, foster cooperation and ensure that project goals are aligned with organizational goals (Varajão et al.,

2022). As a component of Dynamic Capability Theory (DCT), project manager competency is a seizing capability, which allows organizations to convert agile leader's opportunities into coordinated project actions (Berg and Ritschel, 2023).

Competent project managers are able to allocate their resources efficiently, manage the changes of project requirements, and integrate proper technologies into project process, which can lead to the successful project (Setiawan and Rahman, 2025).

This mediation is based on the capability conversion process proposed by DCT that strategic leadership affects the performance of the organization through the mediation of managerial capabilities. Another critical function of software and IT teams is being agile with employees.

Ability to quickly adjust to new technologies, project needs, customer needs and organizational priorities (Whyte and Mottee, 2022). Agile workers keep themselves updated, work inter-functionally, take up new technology and adapt to new demands of the job in a pro-active manner. With software projects often subject to evolving client requirements, new digital technologies, and short development timelines, this flexibility has become ever more critical (Waqar et al., 2023).

2.14 Employee Agility and Workforce-Level Reconfiguration

The agility of employees is distinct from agile leadership and project manager skills. Agile leadership defines the organization's direction and project manager competency defines the project's execution – employee agility reflects the adaptability of the workforce in the actual day-to-day project work (Kathuria et al., 2019; Vignarajah, 2025). Despite having good leadership and competent project managers, the institutions can fail to succeed in projects if the employees do not agree to change or are not flexible enough to implement new requirements of the project. Therefore, agility of employees is seen as a second mediator that directly affects the project execution and delivery performance (Njeri, 2022).

In the DCT context, employee agility is the ability of the workforce to rearrange their tasks, learn new skills and make good use of new technologies. Effective project management alleviates employee flexibility by keeping them well informed, learning and conflict resolution, and correctly allocating tasks (Waqar et al., 2023). Agile workers then contribute to project success by adapting to changes in requirements, delivering quality products and making them customer responsive to change (Hans and Marebane, 2023; Pauwels et al., 2026). It illustrates how the skills of leadership are translated throughout the sequence to operational performance through the competency of managers and adaptability of the workforce (Ahmed, 2016; Mulongo, 2026).

2.15 Artificial Intelligence Adoption as a Technological Enabling Capability

Artificial intelligence (AI) is understood as a technological enabler that helps organizations make better decisions, complete projects more efficiently and gain a competitive advantage through innovation, rather than just about digital technologies. In the software and IT industry, AI-powered applications help in requirement analysis, code generation, testing, prediction of defects, project scheduling, documentation, customer analysis, and knowledge management, leading to optimized project efficiency and responsiveness (Chew and Achananuparp, 2022). But AI isn't always the key to better performance. Leadership support, managerial ability, and employees' readiness to adopt AI in their day-to-day project work are key factors influencing the organizational benefits of AI (Ruiz-Rojas et al., 2024).

Following the principles of Dynamic Capability Theory (DCT), AI is a strategic capability only if it is integrated into the organizational processes of sensing, seizing, and reconfiguring organizational resources (Chhetri, 2024). In contrast, when AI adoption is weak, agile leadership may still encourage flexibility, but project managers may lack the technological support needed to convert responsiveness into high-quality decisions (Wong et al., 2024). Adopting AI could further bolster the link between agility and employee success. With the widespread adoption of

AI, workers can leverage intelligent systems to handle repetitive tasks, retrieve information quickly, detect trends and trends, and adapt to evolving project requirements promptly. As such, the importance of employee agility in project success is likely to be amplified by the use of AI (Chen et al., 2024).

This approach is aligned with Dynamic Capability Theory because technology becomes a capability only when it is integrated into repeatable practices that support sensing, seizing, and reconfiguration (Almaiah et al., 2022).

2.16 Sequential Mediation of the Model

Additionally, the proposed model explains the success of the project in a sequential mediation mechanism. Agile leadership creates an adaptive vision, encourages collaboration, innovation and agility to change (Almaiah et al., 2022; Fuentes-Peñailillo et al., 2024).

The model suggests that the use of AI not only affects a number of the relationships but also does so in a moderated manner.

Specifically, the use of AI is projected to further empower agile leadership and project manager skills since AI-driven systems offer real-time data, foresight, and decision support, which will significantly boost the agile planning, monitoring and resource management process (Arroyo, 2026; Nalavade, 2025). Similarly, AI adoption should further reinforce the correlation between employee agility and project success by freeing up time for agile employees to concentrate on high-value tasks, enhance their organizational learning, and be more responsive to evolving project needs (Saputra et al., 2024).

Such theoretically relevant relationships allow for restricting the moderation to selected pathways in order to increase parsimony of the model and to provide a better conceptual rationale for conducting moderation than testing it along all structural pathways (Sherani et al., 2025). The proposed model therefore represents a more realistic explanation of project success by treating capabilities as interdependent rather than isolated (Cavusgil and Deligonul, 2025).

2.17 Moderating of Artificial Intelligence Adoption

The proposed framework is an important contribution to the research field because it brings together the elements of agile leadership, competency of project managers, employees' agility, the adoption of AI, and project success under a single umbrella. While some studies focused on either one or two of these constructs separately, few studies have explored their sequential relationships, and the enabling role of AI in software and IT organizations ([Abaddi, 2025](#)).

Each construct was placed in the context of the Dynamic Capability Theory that provides a foundation for understanding the impact of these capabilities on project success and how these capabilities work together to create organizational value ([Li and Jin, 2024](#); [Lin and Wu, 2025](#)).

This conceptualization is integrated with theoretical and practical implications.

Theoretically, it extends DCT by showing how the capability to lead is gradually turned into project results by the competency of the manager, adaptability of the workforce, and the technology providede ([Khan et al., 2023](#)).

But more practically, it implies that the development of agile leadership, the development of project managers, agile employees, and the adoption of AI should not be seen as individual efforts by software and IT organizations.

Rather, these capabilities ought to be cultivated in concert with each other, as any lack of strength in a stage of the capability chain can have a dampening effect on the overall performance of the project.

Rather, these capabilities ought to be cultivated in concert with each other, as any lack of strength in a stage of the capability chain can have a dampening effect on the overall performance of the project.

For this reason the direct, mediating, sequential mediating and moderating hypothesis of the study are supported by the literature and have a strong foundation to explain the project success in software and IT organizations in Islamabad ([Khan et al., 2023](#); [Malhotra and Ramalingam, 2025](#)).

2.18 Literature Synthesis and Research Gap Alignment

While agile leadership, the project manager's competency, employees' agility, the use of artificial intelligence, and the success of projects have been extensively explored, the combined examination of these elements under a common framework is still limited. The majority of previous research explores these constructs individually, with a focus on effective leadership, managerial competence, employee adaptability, technology use, and project results, but not on how these factors work together to shape project success ([Hashem and Aboelmaged, 2025](#); [Ostadi et al., 2024](#); [Rosamilha and da Silva, 2025](#)).

Moreover, few studies have examined the sequential mediating effects of the project manager competency and the agility of the employees or the moderating effect of AI adoption based on Dynamic Capability Theory in software and information technology companies. This study aims to fill these gaps by constructing and testing an integrated capability-based model with SmartPLS ([Rane et al., 2024](#)). This is important because the software/IT sector is characterized by simultaneous human and technological change. A literature review that treats each variable separately would not adequately explain how capabilities combine. The integrated synthesis therefore prepares the ground for the SmartPLS model tested in Chapter 4 ([Gama and Magistretti, 2025](#)).

2.19 Integrated Conceptual Justification

The proposed model consists of leadership, managerial, workforce, and technological capabilities and relates them to the project success using Dynamic Capability Theory ([Teece, 2018](#)). The integrated model also has practical relevance for Islamabad-based software/IT organizations. These organizations operate in a competitive environment where project success depends on client responsiveness, technical credibility, innovation, and delivery reliability. The model suggests that firms should not treat agile leadership, project manager training, employee agility,

and AI adoption as separate initiatives. They should be developed as connected capabilities because weakness in one part of the chain can reduce the value of the others (Arshad et al., 2024). Therefore, the literature review supports the direct, mediating, sequential mediating, and moderating hypotheses developed in this thesis. Agile leadership is expected to improve project success directly and through project manager competency and employee agility. AI adoption is expected to strengthen selected capability relationships (Ali et al., 2025).

Overall, the literature supports the view that project success in contemporary software/IT organizations is capability dependent. The core contribution of the proposed model is not the claim that agile leadership, competency, agility, or AI adoption matter individually; prior literature already suggests that they do. The contribution lies in explaining how these constructs work together in a sequential and conditional capability system. This makes the model suitable for a thesis focused on both theoretical explanation and practical project-management relevance (Ameen et al., 2024).

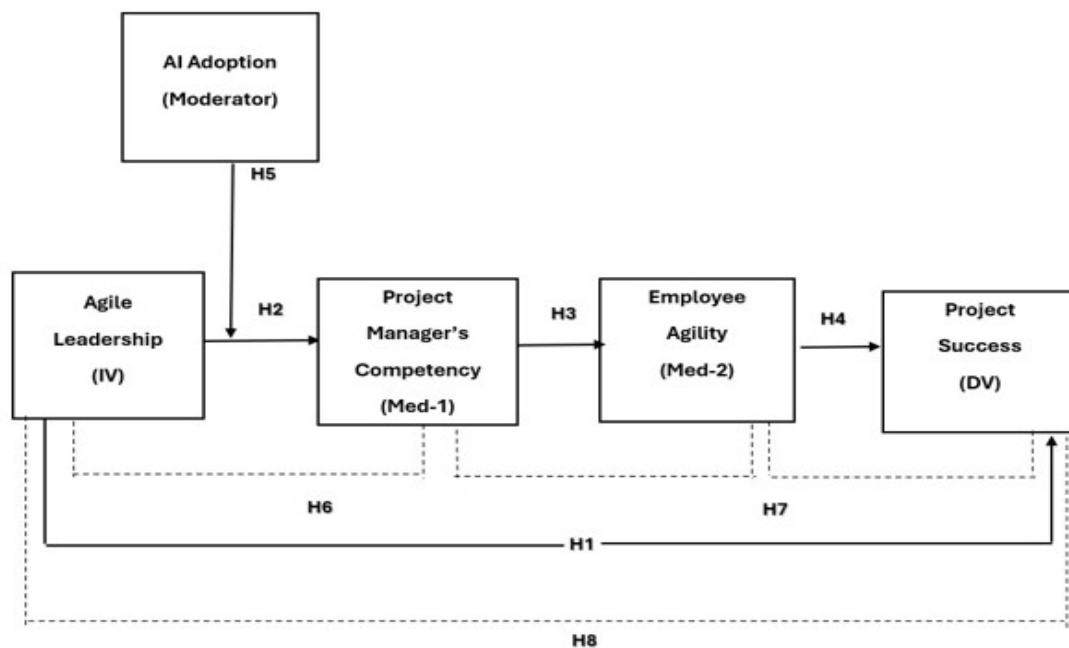


FIGURE 2.1: Conceptual Model

Chapter 3

Research Methodology

3.1 Introduction

This chapter explains the methodological design used to examine the relationship between agile leadership and project success through the sequential mediating roles of project manager competency and employee agility, with artificial intelligence adoption as a boundary condition.

The chapter follows a quantitative, cross sectional , and SmartPLS-oriented design consistent with the approved methodology. The study is positioned within the software and information technology sector in Islamabad, Pakistan.

The chapter explains the philosophical stance, research approach, strategy, population, sampling design, measurement scales, Smart PLS analysis strategy, and ethical safeguards.

3.2 Research Design

The present study adopted a quantitative, explanatory, cross sectional survey design. This design is suitable because the study tests a theoretically specified model involving direct, indirect, sequential mediation, and moderation paths among latent constructs measured through multi-item scales ([Cao et al., 2021](#)).

TABLE 3.1: Summary of Methodological Choices

Methodological Element	Decision Adopted in the Study
Research philosophy	Positivism
Research strategy	Survey strategy
Methodological choice	Quantitative
Purpose of study	Explanatory and correlational
Study setting	Natural/non-contrived software/IT project environment
Researcher interference	Minimal
Unit of analysis	Individual software/IT project professional
Sampling technique	Purposive sampling with controlled snowball follow-up
Target sample	At least 250 responses
Analysis software	SmartPLS for hypothesis testing and model assessment

3.3 Research Philosophy and Approach

This research was designed to respond to the research questions in a systematic manner following the layers of [Ali et al. \(2025\)](#) Research Onion. The positivist philosophy of research is applied in this study at the outermost level, which is suitable for the study when the researcher wants to find answers to pre-specified hypotheses using observable indicators, structured instruments and statistical tests as shown in figure ([Ali et al., 2025](#)).

From a positivism perspective, one can measure organizational behavior with very valid and reliable instruments, and subsequently estimate patterns in these behaviors that are meaningful. A deductive research method was used as one moves towards the inside of the Research Onion. The investigation started with the theoretical aspects of Dynamic Capability Theory and then specific hypotheses were drawn up and tested using empirical evidence ([Abu-Alhaija, 2019](#)).

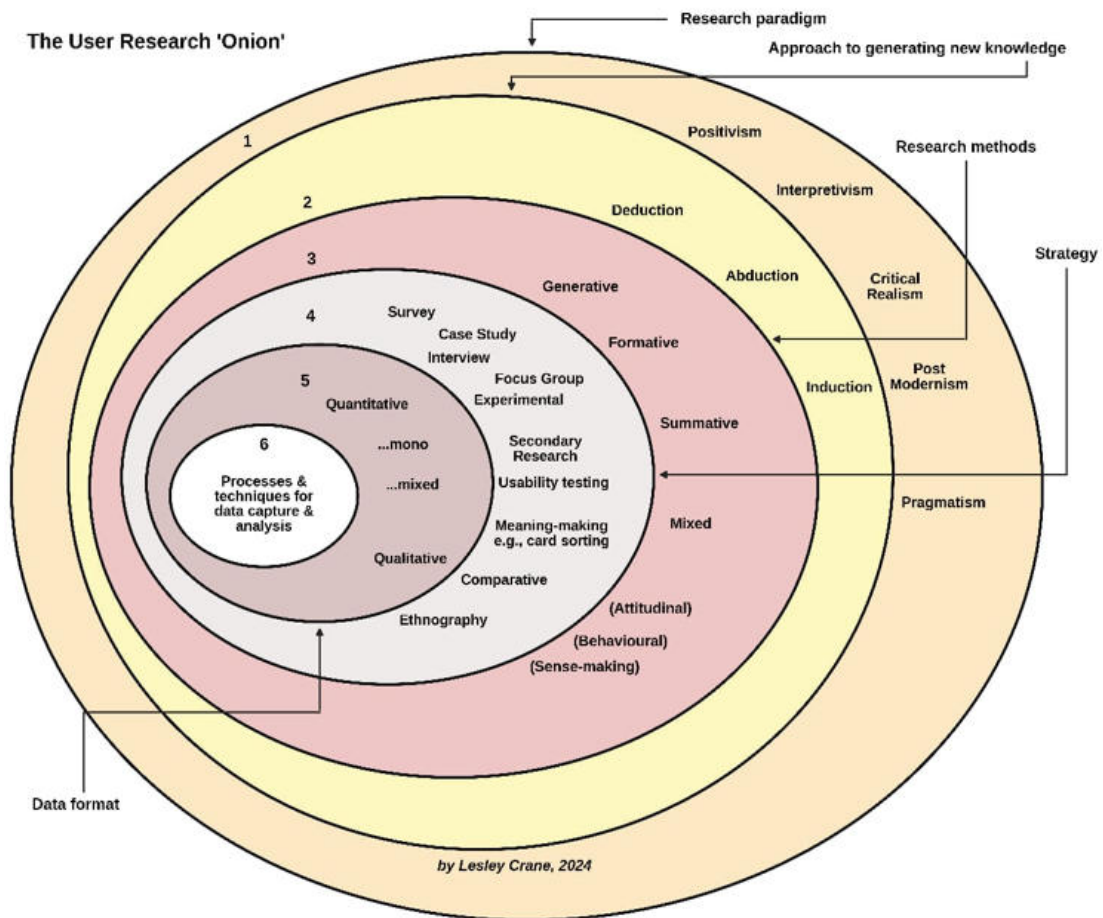


FIGURE 3.1: Research Onion

3.4 Population and Sampling

The target population comprised employees and project professionals working in software and IT organizations operating in Islamabad, Pakistan. Relevant respondents included project employees, team leads, project coordinators, assistant managers, business analysts, quality assurance professionals, and project team members who had worked on or supervised at least one IT or digital project.

This Sampling strategy enhances the reliability of research while ensuring the findings remain generalized to IT project contexts. Purposive sampling was used because not every employee is relevant to the research model. Eligible respondents had to work in a software/IT or digital project environment, understand project leadership and project processes, and be able to participate. Controlled snowball follow-up was used after initial organizational contacts were established,

but respondents were instructed not to forward the questionnaire outside the software/IT project context. To be precise following the norm of PLS-SEM, 263 responses were collected, primarily exceeding the limit ensure strong enhancement in statistical power which improves the other parameters of estimation and benefits the structural model comprising mediation and moderated mediation. Hence the sample size of 263 was considered primarily adequate for PLS SEM analysis (Sarstedt et al., 2021).(Heijstek, 2023).

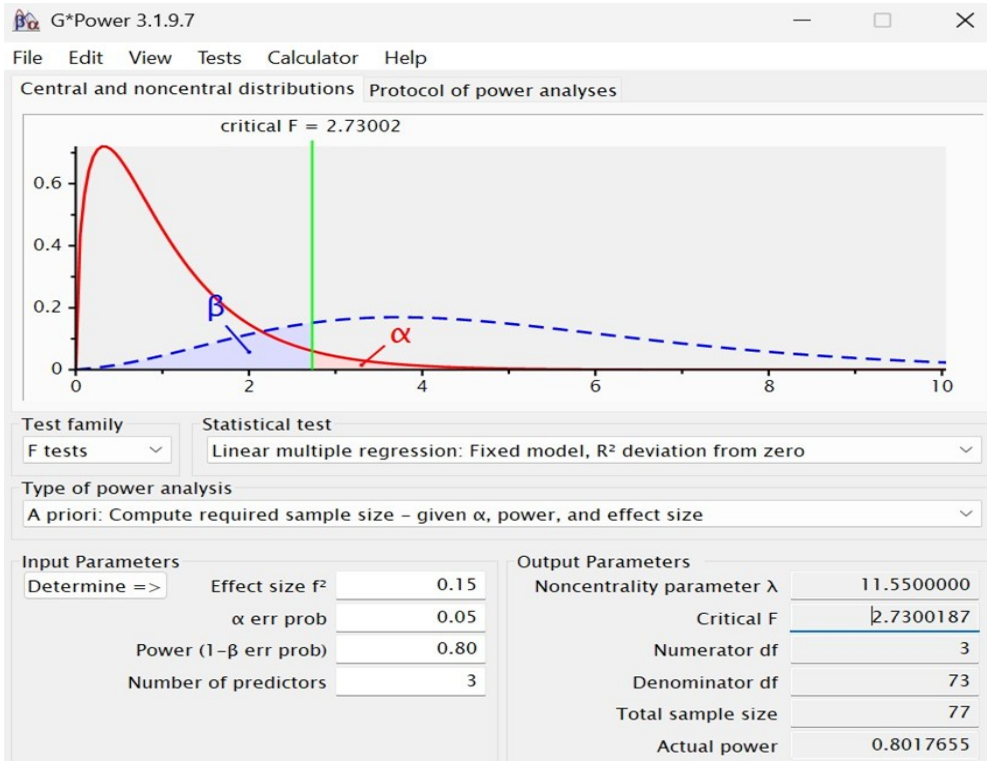


FIGURE 3.2: G* Power (with power = 80%)

3.5 Data Collection Procedure

The Primary Data was collected using a structured questionnaire distributed electronically via Google Forms to Ensure accessibility and participation. The Questionnaire's validated scales were used to measure each Variable.

A total of 263 responses were collected, which is higher than the minimum sample size of 250 recommended for PLS-SEM (Hung et al., 2026; Njeri Mugwe and Runo, 2026). (Jalil et al., 2022).

The sample size is recommended based on the level of statistical power instead of the traditional 10 times rule, and when the sample size is > 200 , it offers strong estimates of the parameters, reliable bootstrapping, and adequate statistical power for complex models (Sarstedt et al., 2021). So, the 263 respondents is enough to support reliable, stable and generalizable PLS-SEM results.

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TABLE 3.2: Demographic Profile of Respondents (N = 263)

Variable	Category	Frequency	Percentage
Gender	Male	189	71.9%
	Female	74	28.1%
Age	18–24 years	143	54.4%
	25–34 years	102	38.8%
	35–44 years	18	6.8%
Highest Qualification	Bachelor	22	8.4%
	Masters	176	66.9%
	MS/M.Phil.	65	24.7%
Current Position	Project Manager	125	47.5%
	Project Coordinator	65	24.7%
	Program Manager	73	27.8%
Project-Related Experience	1–5 years	42	16.0%
	6–10 years	119	45.2%
	11–15 years	28	10.6%
	16–20 years	74	28.1%
	Public Sector	95	36.1%
	Private Organization	48	18.3%
Organization Type	NGO/INGO/CBO	15	5.7%
	Other	105	39.9%
Organization Size	50–250 employees	103	39.2%
	251–500 employees	160	60.8%
Sector/Industry	IT/Technology	227	86.3%
	Other	36	13.7%
Project Type	Development	24	9.1%
	Project		
	IT/Digital Project	165	62.7%
	Other	74	28.1%

The sample comprised 263 respondents, predominantly male (71.9%), aged 18–34 years (93.2%), holding Masters degrees (66.9%), working as Project Managers

(47.5%), with 6–10 years of experience (45.2%), in IT/Technology sector (86.3%), on IT/Digital projects (62.7%) (Zumitzavan, 2026).

TABLE 3.3: ANOVA Results Project Success by Demographic Variables

Variable	F	Df	p-value	Significant
Gender	0.501	(1, 261)	0.480	No
Age	0.814	(2, 260)	0.444	No
Highest Qualification	0.706	(2, 260)	0.495	No
Current Position	1.302	(2, 260)	0.274	No
Project-Related Experience	0.921	(3, 259)	0.431	No
Organization Type	3.274	(3, 259)	0.022	Yes
Organization Size	2.758	(1, 261)	0.098	No
Sector/Industry	0.903	(1, 261)	0.343	No
Project Type	0.007	(2, 260)	0.993	No
Project Supervision Experience	0.004	(1, 261)	0.948	No

One-way ANOVA revealed none significant differences in Project Success scores across nine demographic variables (all $p > 0.05$). Only Organization Type showed significance ($F = 3.274$, $p = 0.022$), indicating that project success perceptions vary by organizational context (Bekele Desta and Lunga, 2025). This confirms demographic homogeneity resulting and support the validity of hypothesis testing (Creswell and Creswell, 2017).

3.6 Measurement Scales

All constructs were measured on a five-point Likert scale ranging from 1 = strongly disagree to 2= dis agree 3= neutral 4 agree 5 = strongly agree. The scales were treated as reflective because the indicators were expected to reflect the underlying

latent construct. Higher scores indicated stronger agreement with the construct (Hair et al., 2022; Creswell & Creswell, 2023).

TABLE 3.4: Measurement Scale Summary

Construct	Role in Model	Items	Measurement	Source
Agile Leadership	Independent variable	32	Adopted agile leadership scale; 5-point Likert.	Kaya (2023)
AI Adoption	Moderator	5	Adopted AI/advanced technology adoption items; 5-point Likert.	Shaban et al. (2026)
Project Manager's Competency	Mediating	8	Adopted project manager competency items; 5-point Likert.	Irfan et al. (2021)
Employee Agility	mediator	7	Adopted employee/workforce agility items.	Muduli (2017)
Project Success	Dependent variable	15	Adopted multidimensional project success items covering time, cost, quality, stakeholder satisfaction, impact, and sustainability.	Bajcar et al. (2026)

3.7 Data Editing Coding and Screening

Demographic variables were coded categorically. Construct means were computed for descriptive screening; however, hypothesis testing was based on item-level latent construct logic consistent with SmartPLS reporting (Hair et al., 2022; Kock, 2015; Ringle et al., 2024).

3.8 Data Analysis Using Smart PLS

Smart PLS was selected as the primary and only software for hypothesis testing and model assessment because the model includes multiple latent variables, reflective measurement, mediation, sequential mediation, moderation, and prediction-oriented objectives. PLS-SEM is appropriate for complex models and theory development/extension, especially when the purpose is prediction and explanation rather than covariance reproduction alone ([Njeri Mugwe and Runo, 2026](#)). SPSS and other general statistical tools were not selected for hypothesis testing because they do not estimate the complete measurement and structural model in the same integrated manner as SEM software. SPSS may provide descriptive statistics or regression estimates, but it is not suitable as the main tool for evaluating reflective measurement quality, discriminant validity, structural paths, bootstrapped indirect effects, and moderation in a latent-variable model ([Ameen et al., 2024](#)).

3.9 Instrument Design and Measurement Operationalization

The study focused on examining the relationships between agile leadership, artificial intelligence (AI) adoption, project manager competency, employee agility, and project success at one single time, thus the cross-sectional survey design was used. The advantages of cross-sectional surveys, as used in management and organizational research, include data collection from many respondents in a standardized way; they can also be used to test hypotheses, and are well suited for structural equation modeling (SEM) when examining the relationships among latent constructs ([Koo and Yang, 2025](#)).

There were 67 measurement items (Agile Leadership = 32, AI Adoption = 5, Project Manager Competency = 8, Employee Agility = 7, and Project Success = 15) not including the demographic questions. When validated scales are used and constructs are multi-dimensional, the use of a single questionnaire consisting of 60–80 items is methodologically acceptable in the study of management. The

questionnaires thus improve construct coverage and content validity and do not require too much time to complete, about 10–15 minutes, reducing interviewee burden and ensuring the quality of response ([Lindner and Lindner, 2024](#)).

Previously validated reflective measures were used in the questionnaire to increase reliability, validity, and comparability with previous studies. All constructs were assessed on a five-point Likert-like scale ranging from 1 = Strongly Disagree, 2 = Dis Agree, 3 = Neutral , 4 = Agree to 5 = Strongly Agree, which is recommended in the literature for assessing perceptions and attitudes and is appropriate for the balance of response discrimination, reliability, and ease of completion ([Dawes, 2008](#)). In keeping with the guidelines of PLS-SEM, all indicators were treated as reflective constructs, that is, the observable indicators were taken as indicators of the underlying latent variables, but they do not constitute them ([Tanujaya et al., 2022](#)).

3.10 Non-Response and Attrition Control

The controlled snowball follow-up was used cautiously. Respondents were not encouraged to forward the questionnaire to unrelated participants ([Lynn, 2017](#)). The purpose was not to maximize numerical responses at any cost, but to reach relevant software/IT project professionals. This approach balanced sample access with contextual control. It also reduced the risk of collecting responses from participants who lacked project-related experience ([Eisner et al., 2019](#)).

3.11 Smart PLS Model Specification

The Smart PLS model was specified with agile leadership as the independent variable, project manager competency and employee agility as mediators, AI adoption as moderator, and project success as the dependent variable ([Choga, 2019](#)). The structural model included direct paths from agile leadership to project manager competency, employee agility, and project success; from project manager competency to employee agility and project success; from employee agility to project

success; and from AI adoption to relevant endogenous constructs where required for moderation estimation. Interaction terms were specified for $AL \times AIA \rightarrow PMC \rightarrow EA \times \rightarrow PS$ (Cao et al., 2021). The model specification followed the study hypotheses. H1 tested the direct effect of agile leadership on project success. H2 tested agile leadership to project manager competency. H3 tested project manager competency to employee agility. H4 tested employee agility to project success. H6 to H7 tested indirect effects through project manager competency, employee agility, and their sequential pathway. H5 tested moderation by AI adoption. H8 tested Moderated Mediation. The conditional indirect effect was then interpreted to understand whether the sequential pathway changed across AI adoption levels (Margalina et al., 2026; Sarstedt and Cheah, 2019).

Smart PLS was appropriate because it estimates measurement and structural models together and supports bootstrapping for direct, indirect, and interaction effects. It also provides reliability, convergent validity, discriminant validity, collinearity, R-square, effect size, and predictive relevance outputs. This integrated capability made Smart PLS more suitable than ordinary regression alone for the present model (Wong, 2013). Model specification also required alignment between theory and the direction of paths. The hypothesized order was not arbitrary. Agile leadership preceded the mediators because it represented a leadership capability, project manager competency preceded employee agility because managers structure project work conditions, and project success was placed last because it represented the outcome of the capability chain. This alignment reduced inconsistency between theory, hypotheses, and statistical testing (Hair et al., 2025).

3.12 Higher-Order Construct Specification

Agile leadership was modeled as a reflective- higher-order construct (HOC). In Stage 1, 32 items loaded onto six first-order dimensions: Creativity (C), Coaching (CO), Flexibility (F), Quality (Q), Responsiveness (R), and Technological Communication (TC). In Stage 2, latent variable scores from these six dimensions served as indicators of the second-order AL construct. This two-stage approach

reduces model complexity while preserving the multidimensional theoretical structure (Sarstedt and Cheah, 2019).

3.13 Bootstrapping and Mediation Testing Procedure

Bootstrapping was used to test the significance of direct and indirect effects. PLS-SEM does not require strict multivariate normality because it uses a non-parametric procedure to estimate standard errors and confidence intervals. In this study, path significance was interpreted through beta coefficients, t-values, p-values, and confidence intervals. A hypothesis was supported when the path was theoretically aligned, statistically significant at the conventional level, and the confidence interval did not include zero (Dastgeer et al., 2020).

Mediation was assessed through bootstrapped indirect effects. The first mediation path examined whether project manager competency transmitted the effect of agile leadership to project success. The second mediation path examined whether employee agility transmitted the effect of agile leadership to project success (Kaabachi et al., 2025). The sequential mediation path examined whether agile leadership influenced project success through project manager competency followed by employee agility. This approach was consistent with recent guidance that mediation in PLS-SEM should be interpreted through bootstrapped confidence intervals rather than only through stepwise regression logic (Alfons et al., 2022).

The total indirect effect was also examined because the model included more than one indirect pathway. A significant total indirect effect indicates that the mediating mechanisms collectively carry a meaningful part of the agile leadership to project success relationship. The direct effect was interpreted alongside indirect effects to determine whether agile leadership still had a unique relationship with project success after accounting for mediators (Kim et al., 2017). The mediation procedure was selected because indirect effects are often non-normally distributed.

A direct normal-theory test may underestimate uncertainty in an indirect pathway, particularly when the model includes sequential mediation. Bootstrapping provides a more suitable basis for inference because it generates empirical sampling distributions for the indirect effects. This is why confidence intervals were treated as central evidence in the mediation tables ([Dastgeer et al., 2020](#)).

3.14 Moderation and Conditional Indirect Effect Procedure

Moderation was tested by creating interaction terms between AI adoption and the relevant predictor variables. The first interaction tested whether AI adoption strengthened the relationship between agile leadership and project manager competency ([Fienberg and Slavković, 2025](#)). The second interaction tested whether AI adoption strengthened the relationship between employee agility and project success. Significant positive interaction coefficients indicate that the focal relationship becomes stronger as AI adoption increases. This step was necessary because an interaction coefficient indicates the presence of moderation but does not by itself show the practical pattern of the relationship ([Creswell and Creswell, 2017](#)).

The conditional sequential indirect effect combined mediation and moderation logic. It examined whether the indirect path from agile leadership to project success through project manager competency and employee agility changed across low, mean, and high AI adoption levels. This procedure aligned with the theoretical claim that AI adoption strengthens the capability pathway rather than merely acting as an independent predictor ([Kim et al., 2017](#)).

The conditional indirect procedure was important for connecting the moderation hypotheses with the sequential mediation logic. If AI adoption changes the strength of a path inside the capability chain, then the overall indirect effect may also change. Testing conditional indirect effects therefore provides a more complete answer than reporting simple interaction terms alone. It shows whether AI

adoption changes the practical strength of the leadership-to-success mechanism ([Arshad et al., 2024](#)).

3.15 Ethical Considerations

The study followed the ethical principles of voluntary participation, informed consent, confidentiality, anonymity, and responsible data use. Participants were informed about the academic purpose of the research and their right to withdraw. No names, CNIC numbers, private phone numbers, or direct personal identifiers were used. Organizational names were anonymized in reporting ([Ruitenburg et al., 2026](#)).

3.16 Chapter Summary

This chapter presented the methodology used to test the relationship between agile leadership and project success through project manager competency and employee agility, with artificial intelligence adoption as a moderator. The chapter described the positivist philosophy, deductive approach, survey strategy, cross sectional design, sampling procedure, measurement scales, data screening, SmartPLS analysis strategy, and ethical safeguards. The next chapter presents the empirical results and analysis.

Chapter 4

Data Analysis and Results

4.1 Introduction

This chapter presents the results of the empirical analysis on dataset. Following the reporting style of the sample thesis, the chapter begins with data screening and respondent profile, then proceeds to descriptive statistics, measurement model evaluation, structural model assessment, mediation, moderation, conditional indirect effects, and hypothesis summary.

The analysis is reported according to SmartPLS/PLS-SEM conventions, including indicator reliability, internal consistency reliability, convergent validity, discriminant validity, collinearity, coefficient of determination, effect size, predictive relevance, path coefficients, bootstrapped indirect effects, and simple-slope interpretation ([Kathuria et al., 2019](#)).

4.2 Measurement Model Evaluation

The measurement model was assessed before testing structural relationships. As all constructs were reflective, the assessment focused on indicator reliability, internal consistency reliability, convergent validity, and discriminant validity ([Wijayathne et al., 2026](#)).

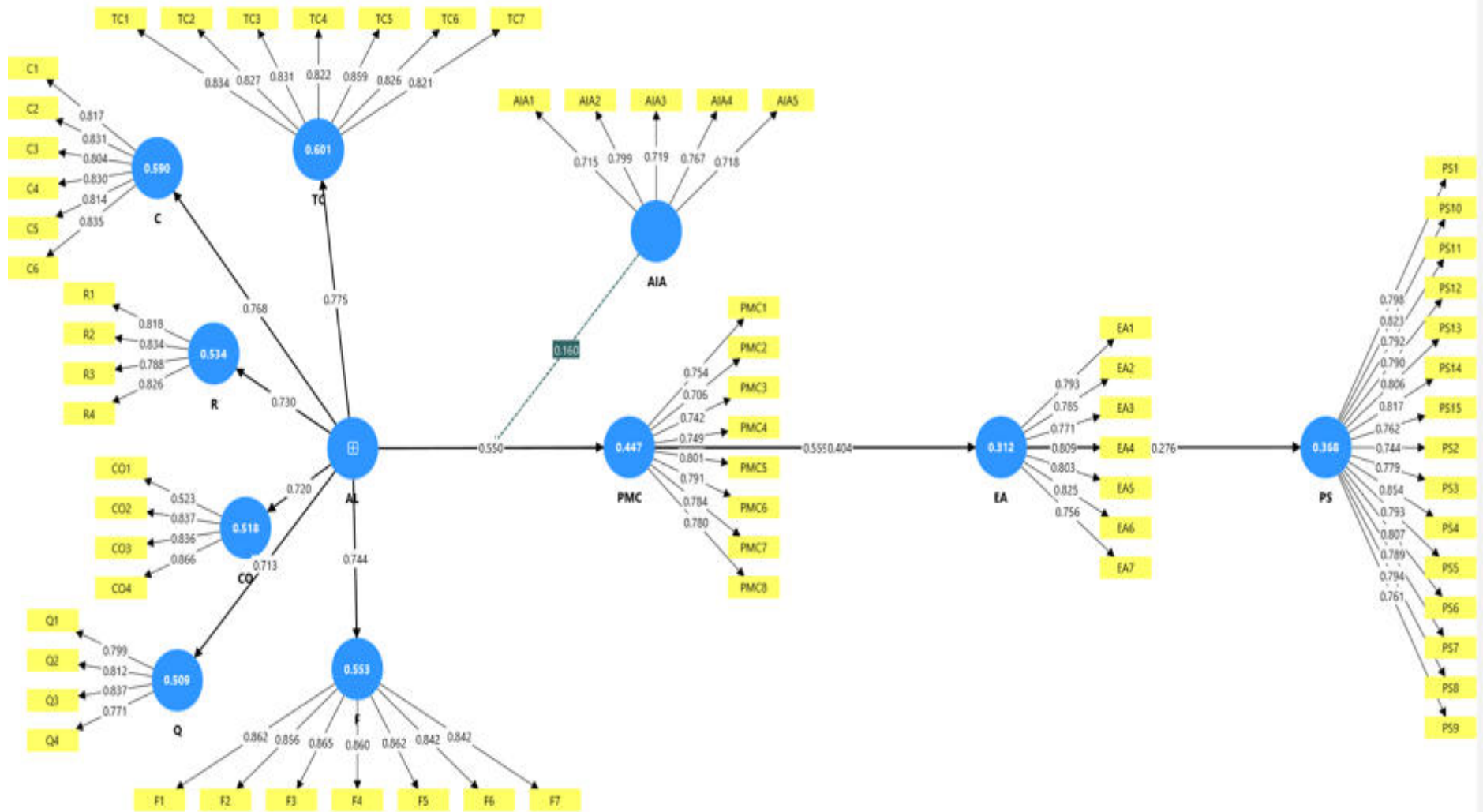


FIGURE 4.1: Measurement Model Stage 1

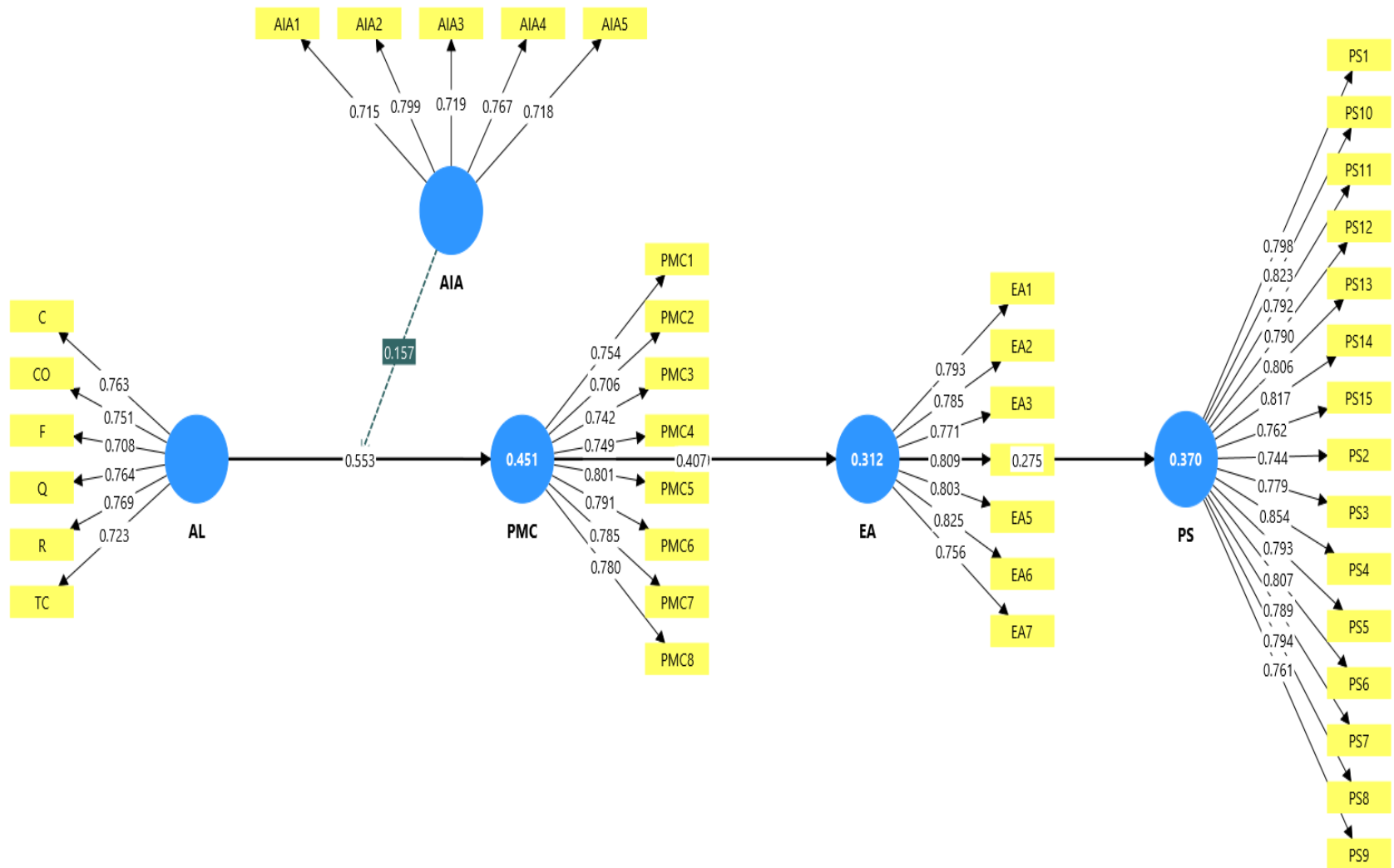


FIGURE 4.2: Measurement Model Stage 2

4.3 Measurement Model Stage 2

Measurement model Stage 2, in which the latent variable score was used as the indicator of Higher order Constructs. The actual item was replaced via the original dimension score, reducing the complexity of the model and maintaining multi dimension structure of constructs. The following sections report outer loadings, Cronbach alpha, ρ_A , composite reliability, AVE, Fornell-Larcker results, and HTMT results ([Gemünden et al., 2018](#)).

4.4 Indicator Reliability

Outer Loadings of Measurement Items

4.4.1 Outer Loadings Agile Leadership Sub-dimensions

Threshold: Outer Loading ≥ 0.70 (preferred); ≥ 0.50

TABLE 4.1: A-Outer loading

Sub-dimension	Item	Outer Loading
C	C1	0.817
C	C2	0.831
C	C3	0.804
C	C4	0.830
C	C5	0.814
C	C6	0.835
CO	CO1	0.523
CO	CO2	0.837
CO	CO3	0.836
CO	CO4	0.866
F	F1	0.862

Table 4.1 continued from previous page

Sub-dimension	Item	Outer Loading
F	F2	0.856
F	F3	0.865
F	F4	0.860
F	F5	0.862
F	F6	0.842
F	F7	0.842
Q	Q1	0.799
Q	Q2	0.812
Q	Q3	0.837
Q	Q4	0.771
R	R1	0.818
R	R2	0.834
R	R3	0.788
R	R4	0.826
TC	TC1	0.834
TC	TC2	0.827
TC	TC3	0.831
TC	TC4	0.822
TC	TC5	0.859
TC	TC6	0.826
TC	TC7	0.821

Highest: CO4 = 0.866. CO4 is the strongest indicator. CO1 (0.523) is lowest but still acceptable. Flexibility (F) and Coaching (CO) items show consistently high loadings ([Khosravi et al., 2025](#)).

TABLE 4.2: B –Outer loading (Continue)

Construct	Item	Outer Loading
PMC	PMC1	0.754
PMC	PMC2	0.706
PMC	PMC3	0.742
PMC	PMC4	0.749
PMC	PMC5	0.801
PMC	PMC6	0.791
PMC	PMC7	0.784
PMC	PMC8	0.780
PS	PS1	0.798
PS	PS2	0.744
PS	PS3	0.779
PS	PS4	0.854
PS	PS5	0.793
PS	PS6	0.807
PS	PS7	0.789
PS	PS8	0.794
PS	PS9	0.761
PS	PS10	0.823
PS	PS11	0.792
PS	PS12	0.790
PS	PS13	0.806
PS	PS14	0.817
PS	PS15	0.762
AIA	AIA1	0.715
AIA	AIA2	0.799

Table 4.2 continued from previous page

Construct	Item	Outer Loading
AIA	AIA3	0.719
AIA	AIA4	0.767
AIA	AIA5	0.718
EA	EA1	0.793
EA	EA2	0.785
EA	EA3	0.771
EA	EA4	0.809
EA	EA5	0.803
EA	EA6	0.825
EA	EA7	0.756

The outer loadings ranged from 0.523 to 0.866 across all indicators. The loadings were strongest for Project Success. Highest as per Construct: PMC5 = 0.801 — PS4 = 0.854 — AIA2 = 0.799 — EA6 = 0.825

4.4.2 Construct Reliability and Convergent Validity

Thresholds: CA ≥ 0.70 — CR (ρ_A/ρ_c) ≥ 0.70 — AVE ≥ 0.50

TABLE 4.3: Construct Reliability and Convergent Validity

Constructs	CA	CR (ρ_A)	CR (ρ_c)	AVE
AIA	0.798	0.800	0.861	0.554
AL	0.841	0.843	0.883	0.558
EA	0.901	0.903	0.922	0.627
PMC	0.898	0.901	0.918	0.584
PS	0.958	0.960	0.962	0.631

Highest Construct: PS (Project Success) — CA = 0.958, CR = 0.960/0.962, AVE = 0.631. PS is the most reliably and precisely measured construct. All values exceed thresholds, confirming strong convergent validity ([Padgett et al., 2025](#)).

Cronbach alpha values ranged from 0.798 to 0.958, and composite reliability values ranged from 0.861 to 0.922. These values exceeded the minimum 0.70 threshold, indicating acceptable internal consistency reliability.

AVE values were 0.558 for agile leadership, 0.554 for AI adoption, 0.584 for project manager competency, 0.627 for employee agility, and 0.631 for project success. AI adoption was at the 0.554 above threshold.

The scales were theoretically adopted and composite reliability exceeded the acceptable threshold, the constructs were retained for structural testing, but findings should be interpreted with attention to this measurement limitation ([Etemad et al., 2026](#)).

4.4.3 Discriminant Validity Fornell-Larcker Criterion

Table Rule: Square root of AVE (diagonal, bold) must exceed all off-diagonal correlations in the same row/column.

TABLE 4.4: Discriminant Validity Fornell-Larcker Criterion

Constructs	AIA	AL	EA	PMC	PS
AIA	0.744				
AL	0.221	0.747			
EA	0.176	0.575	0.792		
PMC	0.303	0.623	0.559	0.764	
PS	0.205	0.565	0.509	0.740	0.794

PS diagonal = 0.794 (square root of AVE). PS has the strongest discriminant validity. Its AVE square root exceeds all correlations with other constructs (max off diagonal = 0.740). All constructs satisfy the criterion ([Hmaidan et al., 2025](#)).

4.4.4 Discriminant Validity — HTMT Criterion

TABLE 4.5: Threshold: HTMT < 0.85 (conservative) or < 0.90

Constructs	AIA	AL	EA	PMC	PS
AIA					
AL	0.264				
EA	0.209	0.655			
PMC	0.353	0.710	0.614		
PS	0.233	0.623	0.543	0.796	

Highest value is for PMC-PS = 0.796 (still well below 0.85 threshold). All constructs are empirically distinct. No excessive overlap exists between any pair of variables.

4.5 Structural Model Assessment

After measurement model assessment, the structural model was evaluated. The assessment included collinearity diagnostics, coefficient of determination, effect sizes, predictive relevance, and path coefficients. The structural model tested the direct, mediation, sequential mediation, moderation, and conditional indirect relationships proposed in the thesis ([Ruitenburt et al., 2026](#)).

4.5.1 Collinearity Assessment VIF Values

TABLE 4.6: VIF Thresholds: VIF < 3.3 (conservative, no collinearity concern) — VIF < 5.0 (common threshold) — VIF < 10.0 (liberal threshold) VIF Summary by Construct

Construct	Number of Items	Min VIF	Max VIF	Mean VIF
AIA	5	1.393	1.742	1.545
AL	6	1.466	1.835	1.702
EA	7	1.854	2.363	2.107
PMC	8	1.680	2.172	1.950
PS	15	2.183	3.273	2.524

All values were well below the conservative threshold of 3.3 and the broader threshold of 5.0. Therefore, lateral collinearity did not threaten the estimation of structural paths ([Florea et al., 2026](#)).

4.5.2 Coefficient of Determination and Predictive Relevance

Thresholds: $R^2 \geq 0.25$ (weak), ≥ 0.50 (moderate), ≥ 0.75 (substantial) — $Q^2_{\text{predict}} > 0$ indicates predictive relevance.

TABLE 4.7: Coefficient of Determination and Predictive Relevance

Constructs	R^2	R^2 Adjusted	Q^2_{predict}	RMSE	MAE
PMC	0.312	0.310	0.424	0.765	0.608
EA	0.451	0.445	0.274	0.860	0.713
PS	0.370	0.365	0.313	0.836	0.673

Highest R^2 : EA = 0.451 Highest Q^2 predict: PMC = 0.424 (strongest predictive relevance). EA is the best-explained construct. PMC is the best predicted. All $Q^2_{\text{predict}} > 0$ confirms the model has predictive relevance. These values indicate weak-to-moderate explanatory power in a behavioral project-management context. The Q^2 predict values were positive for all endogenous constructs, with values of 0.424 for project manager competency, 0.274 for employee agility, and 0.313 for project success. Positive Q^2 values indicate predictive relevance for the endogenous constructs (Khanagha et al., 2022).

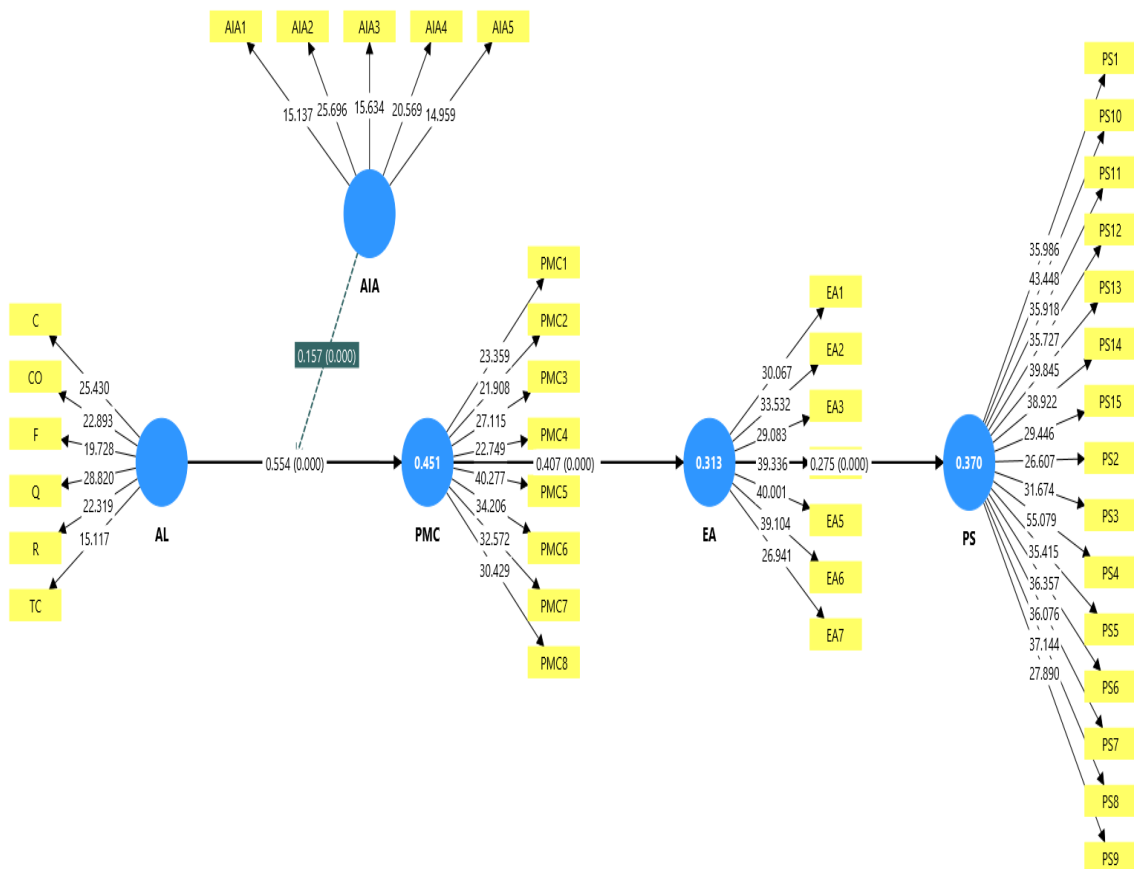


FIGURE 4.3: Structural Model with Standardized Path Coefficients

4.6 Direct Effects Direct Path Hypotheses Structural Model

TABLE 4.8: Thresholds: $|t| > 1.96$ ($p < 0.05$) — f^2 : 0.02 (small), 0.15 (medium), 0.35 (large)

Hypotheses	β	M	STDEV	T Values	f^2	P values	2.5% LLCI	97.5% ULCI	Remarks
AL→ PS	0.407	0.411	0.066	6.202	0.176	0.000	0.287	0.540	Supported
AL →PMC	0.554	0.553	0.053	10.519	0.517	0.000	0.440	0.648	Supported
PMC →EA	0.559	0.563	0.052	10.729	0.454	0.000	0.456	0.660	Supported
EA → PS	0.275	0.275	0.070	3.952	0.081	0.000	0.137	0.407	Supported
AIA × AL → PMC	0.157	0.156	0.037	4.243	0.063	0.000	0.088	0.234	Supported

Strongest Path (β): $PMC \rightarrow EA = 0.559$. Largest effect size (f^2): $AL \rightarrow PMC = 0.517$ (large effect). $AL \rightarrow PMC$ is the most practically meaningful relationship. $PMC \rightarrow EA$ has the strongest coefficient. All five hypotheses are supported ($p = 0.000$).

The Positive significant effect $AIA \times AL \rightarrow PMC = 0.157$ $P = (0.000)$, Direct Effect $AL \rightarrow PMC = 0.554$, $P = 0.000$. Similarly direct effect $PMC \rightarrow EA = 0.559$ (0.000), and direct positive Impact $EA \rightarrow PS = 0.275$ $P = (0.000)$. These results support the core argument that agile leadership contributes to project success both directly and through capability-conversion mechanisms (Ubaidillah et al., 2026)

4.6.1 Indirect Path Hypotheses

TABLE 4.9: Threshold: Indirect effect significant if 95% CI does not include zero

Hypotheses	β	M	STDEV	T Values	P values	2.5% LLCI	97.5% ULCI	Remarks
AL $\rightarrow$ PMC $\rightarrow$ EA	0.310	0.313	0.049	6.286	0.000	0.215	0.406	Supported
AL $\rightarrow$ PMC $\rightarrow$ EA $\rightarrow$ PS	0.085	0.086	0.027	3.149	0.002	0.038	0.144	Supported
AIA $\times$ AL $\rightarrow$ PMC $\rightarrow$ EA $\rightarrow$ PS	0.024	0.024	0.010	2.486	0.013	0.009	0.047	Supported

Strongest Indirect Path: AL $\rightarrow$ PMC $\rightarrow$ EA = 0.310 (t = 6.286, p = 0.000).

PMC and EA are the Sequential mediator 1 and Sequential Mediator 2 respectively. Agile Leadership’s impact on Environmental Agility is largely transmitted through building Project Management Competency first.

All five indirect effects are significant. All respective p-values are below 0.05 for H6= 0.000, H7= (0.002), H8= (0.013) (Coutts & Hayes, 2023).

4.7 Moderation Results

Method: Simple slope analysis at -1 SD, Mean, and +1 SD of the moderator (AIA)

TABLE 4.10: TABLE Conditional Direct Effect AL $\rightarrow$ PMC at AIA Levels

AIA Level	AL $\rightarrow$ PMC Effect
AIA at +1 SD (High)	0.710
AIA at -1 SD (Low)	0.396
AIA at Mean	0.553

Highest Effect: AIA at +1 SD (High AI Adoption) = 0.710. High AI Adoption nearly doubles the AL $\rightarrow$ PMC effect compared to low AIA (0.396). AI Adoption is a powerful amplifier of Agile Leadership.

4.7.1 Simple Slopes for Significant Moderation Effects

Method: Simple slope analysis at -1 SD, Mean, and +1 SD of the moderator (AIA)

TABLE 4.11: Conditional Direct Effect AL $\rightarrow$ PMC at AIA Levels

AIA Level	AL $\rightarrow$ PMC Effect
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Highest Effect: AIA at +1 SD (High AI Adoption) = 0.710. High AI Adoption nearly doubles the AL $\rightarrow$ PMC effect compared to low AIA (0.396). AI Adoption is a powerful amplifier of Agile Leadership.

4.7.2 Conditional Indirect Effects at AIA Levels

Paths: AL $\rightarrow$ PMC $\rightarrow$ EA (partial mediation) — AL $\rightarrow$ PMC $\rightarrow$ EA $\rightarrow$ PS (full sequential mediation)

HIGHEST FULL CHAIN: AL $\rightarrow$ PMC $\rightarrow$ EA $\rightarrow$ PS at +1 SD AIA = 0.109. AI Adoption magnifies the entire mediation chain. The full path from Leadership to Success is strongest when AI Adoption is high.

TABLE 4.12: Conditional Indirect Effects at AIA Levels

AIA Level	AL $\rightarrow$ PMC $\rightarrow$ EA	AL $\rightarrow$ PMC $\rightarrow$ EA $\rightarrow$ PS
AIA at +1 SD (High)	0.397	0.109
AIA at -1 SD (Low)	0.221	0.061
AIA at Mean	0.309	0.085

Highest Indirect: AL $\rightarrow$ PMC $\rightarrow$ EA at +1 SD AIA = 0.397.

AI Adoption as Moderator of the AL-PMC Relationship

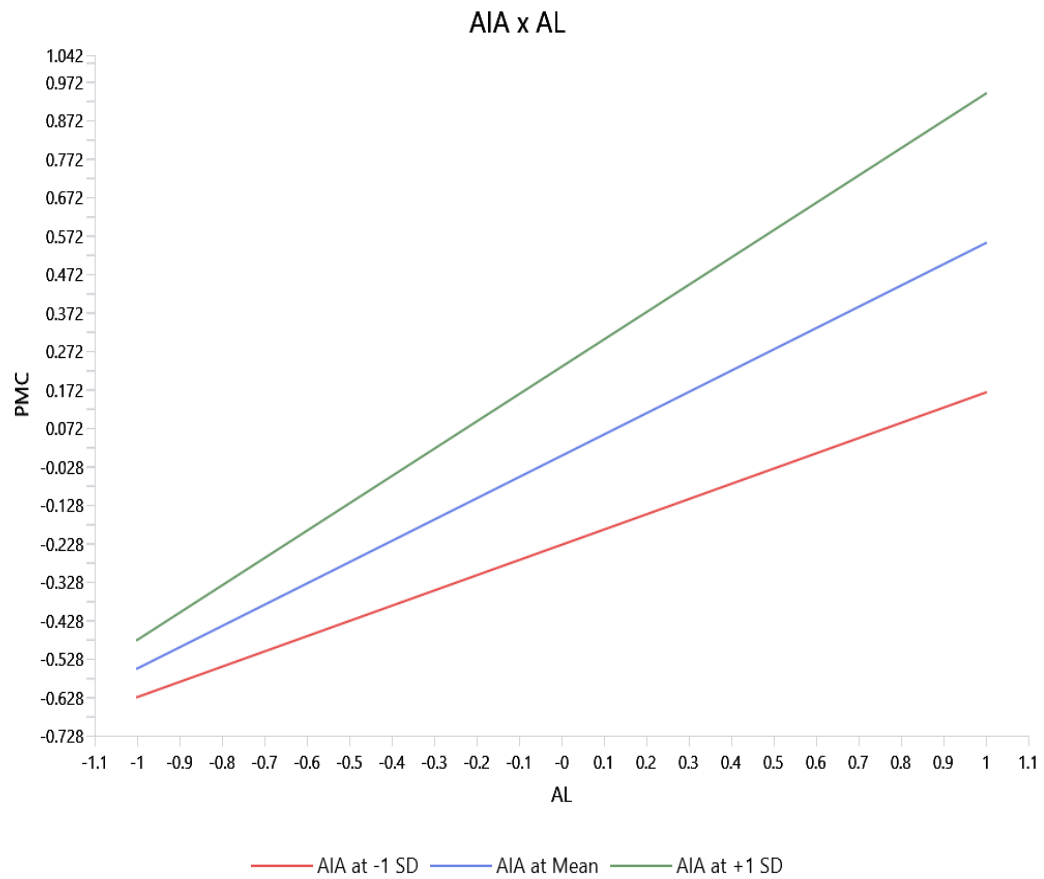


FIGURE 4.4: AI Adoption as Moderator of the AL-PMC Relationship

Green line (+1 SD AIA) has the steepest slope and reaches the highest PMC values. The widening gap between lines proves high AI Adoption creates the strongest PMC boost from AL. The synergy compounds at higher leadership levels.

4.7.3 AI Adoption as Moderator of the AL-PMC Relationship

The interaction between agile leadership and AI adoption had a positive and significant effect on project manager competency. The simple-slope results showed that the agile leadership-project manager competency relationship was stronger when AI adoption was high than when AI adoption was low. This means that agile leadership is more strongly converted into project manager competency when organizations have higher AI adoption.

The interaction between employee agility and AI adoption had a positive and significant effect on project success. The simple-slope results showed that the employee agility-project success relationship was stronger when AI adoption was high than when AI adoption was low. This indicates that agile employees generate stronger project-success benefits when they work in organizations where AI tools and advanced technologies are more actively adopted ([Jakobsson and Samimian, 2023](#)).

4.8 Direct Path Interpretation in Dynamic Capability Terms

The direct path from agile leadership to project success was positive and significant. This finding indicates that agile leadership contributes to project success even after accounting for project manager competency, employee agility, AI adoption, and interaction effects.

The result is consistent with the view that agile leadership improves responsiveness, coordination speed, learning orientation, and team focus. However, the direct effect was smaller than some mediated components, which suggests that leadership is important but not sufficient on its own ([Kathuria et al., 2019](#)).

Agile leadership also had a positive and significant effect on project manager competency and employee agility. These findings are central to the capability-chain logic. Agile leaders appear to create an environment in which project managers

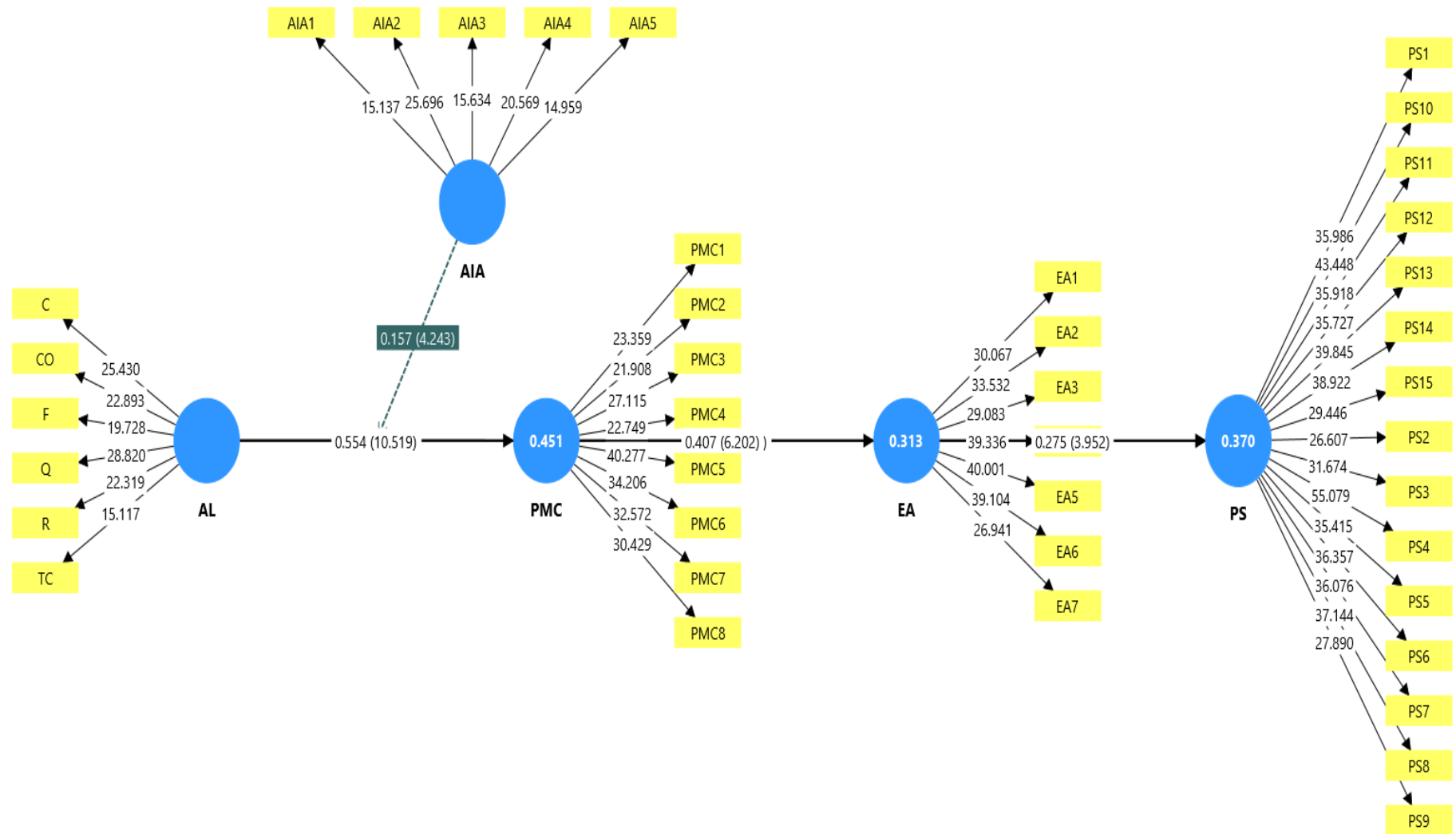


FIGURE 4.5: Structural Model with t-values and p-values

can become more competent and employees can behave more flexibly. The stronger path from agile leadership to employee agility suggests that agile leadership may influence team adaptability directly through empowerment, communication, flexible planning, and innovation support.

Project manager competency had positive effects on employee agility and project success. This supports the view that competent project managers provide the coordination, task clarity, conflict management, and project-methodology knowledge needed for adaptive teams and successful projects. Employee agility also had a positive effect on project success, confirming that workforce adaptability is a key execution-level capability. Figure 5 presents the bootstrapped structural model with standardized coefficients and t-values ([Jakobsson and Samimian, 2023](#)).

The pattern of direct effects also supports the decision to include mediators. If agile leadership had only a direct effect on project success, the model would provide limited explanation of how leadership works. Instead, the results show that agile leadership affects project manager competency and employee agility, and those constructs also affect project success. This confirms that the leadership-success relationship is partly transmitted through capability development.

4.9 Structural Model with t-values and p-values

Structural model diagram displaying all path coefficients with t-values and p-values in parentheses. Outer loading t-values are shown on item arrows. All structural paths show $p = 0.000$. Extremely high t-values confirm that every item respectively is highly significant. All paths with $p = 0.000$ provide the strongest evidence that the entire model is robust and every hypothesis is empirically supported.

4.10 Summary of Hypothesis Testing

Overall, the results support the proposed model. Agile leadership contributes to project success directly and indirectly through project manager competency and

employee agility. Artificial intelligence adoption strengthens both the leadership-to-competency link and the agility-to-success link, and the sequential indirect effect is strongest when AI adoption is high. The findings are consistent with Dynamic Capability Theory because they show that project success arises from linked sensing, seizing, reconfiguring, and technological enabling capabilities ([Langholf and Wilkens, 2021](#)).

4.11 Chapter Summary

This chapter presented the complete results and analysis of the study. Descriptive statistics indicated positive perceptions across all constructs. Reliability was satisfied, while convergent validity and AVE values were satisfied within the threshold for constructs. Structural model results supported the direct, mediating, sequential mediating, moderating, and conditional indirect relationships. The next chapter discusses these findings in relation to theory, prior literature, practical implications, limitations, and future research directions.

Chapter 5

Discussion and Conclusion

5.1 Introduction

This chapter discusses the empirical findings presented in Chapter 4. It interprets the results in light of Dynamic Capability Theory and the software/IT project context of Islamabad. The chapter also presents theoretical, practical, methodological, and contextual implications, followed by limitations, future research directions, and conclusion.

5.2 Discussion of Findings

5.2.1 Discussion of H1: Agile Leadership and Project Success

H1: Agile leadership has a positive effect on project success.

The results confirmed the hypothesis H1, which states that agile leadership positively and significantly impacts project success. The findings of the structural model indicate that agile leadership has positive influences on software project success ($\beta = 0.407$, $p = 0.000$, $t=6.202$) meaning that an increase in agile leadership practices would help in improving the probability of software project success. This means that H1 is accepted. A positive beta coefficient suggests the direction

of the relationship, and a significant t-value (above $|1.96|$) and p-value (below 0.05) means the relationship is statistically significant (Wang et al., 2024).

This discovery confirms that agile leaders foster flexibility, teamwork, quick decision making, innovation, and adaptability to technological and customer changes that lead to better project results.

These leadership skills can be particularly crucial in software and IT projects, helping teams adapt to changing needs while ensuring the project's quality and satisfaction for stakeholders.

The result aligns with Dynamic Capability Theory (DCT) that suggests that organizations with superior performance are those that leaders are good at sensing changes in the environment and mobilizing organizational resources to respond to those changes (Hung et al., 2026).

Agile leadership, then, is the sensing that starts the adaptation process within the organization. The finding is consistent with the previous studies that showed the positive effects of agile leadership on the effectiveness of the organization and project success due to its ability to respond rapidly, innovate, and foster collaboration among team members (Heijstek, 2023).

Thus, it is recommended that software companies invest in agile leadership skills to enhance the project performance in a dynamic environment.

5.2.2 Discussion of H2: Agile Leadership and Project Manager Competency

H2: Agile leadership has a positive effect on project manager competency.

The findings are very supportive of H2. Agile leadership significantly influences project manager competency ($\beta = 0.554$, $t = 10.519$, $p < 0.001$, $f^2 = 0.517$).

The standardized beta coefficient is a positive value, suggesting a strong positive relationship, and the t-value is high along with the p-value being highly significant, supporting the statistical strength of the relationship (Njeri Mugwe and Runo, 2026). Moreover, the large effect size ($f^2 = 0.517$) demonstrates that agile

leadership makes a substantial contribution to explaining project manager competency. Hence, H2 is accepted.

It appears that agile leaders establish an atmosphere of empowerment, collaboration, continuous learning, and technological awareness, which enhances the project manager's planning, coordination, communication, leadership and decision-making abilities.

These are important skills in software and IT projects where uncertainty and evolving customer needs necessitate quick customer responses.

The agile leadership is seen as the sensing capability while project manager competency is an organizational seizing capability in terms of converting strategic intentions into effective project action (Kathuria et al., 2019; Vignarajah, 2025).

The result is consistent with that of (Varajão et al., 2022) and (Zhang et al., 2025), who found that supportive leadership can have a positive impact on the work competency of project managers, as well as on project performance.

This study also showed that the agile leadership has a huge influence on developing capable project managers in software industry of Pakistan which further emphasizes the importance of agile leadership in software industry of Pakistan.

5.2.3 Discussion of H3: Project Manager Competency and Employee Agility

H3: Project manager competency has a positive effect on employee agility.

The empirical results support H3 very well. Project manager competency significantly improves employee agility ($\beta = 0.559$, $t = 10.729$, $p < 0.001$, $f^2 = 0.454$). The positive beta shows that improved managerial competency significantly contributes to the adaptability, learning capacity, and flexibility of employees.

The t-value is extremely high and the p-value is very significant, which indicates that the relationship is statistically significant; and the effect size ($f^2 = 0.454$) is high, meaning that the relationship has a high level of practical significance (Arshad et al., 2024). Hence, H3 is accepted.

This discovery shows that effective project managers set clear communication, efficient coordination, regular feedback and enabling learning environments that allow workers to swiftly learn new technologies and project needs. This is especially useful in software development context where uncertainty and constant innovation prevail.

In the perspective of the Dynamic Capability Theory, project manager competency is the capability of the organization to seize, while the employees' agility is the capability to reconfiguring, which involves changing the behaviors and work practices in response to the environment changes (Teece, 2018).

The result aligns with previous studies that found that project management leads the employees to be more adaptable, collaborative and flexible in their work. The high impact found indicates that having competent project managers is one of the most significant factors affecting employee agility levels within software and IT businesses.

5.2.4 Discussion of H4: Employee Agility and Project Success

H4: The more agile the employees, the more successful the project.

The results showed that the agility of employees has a positive relationship with project success (H4: $\beta = 0.275$, $t = 3.952$, $p = 0.001$, $f^2 = 0.081$). The positive beta coefficient indicates that agility of employees is correlated with positive results in the project. The marked t- and p-values show statistical significance, but the small-to-medium effect size ($f^2 = 0.081$) suggests that agility is a significant organizational attribute, albeit in conjunction with other organizational skills (Lin and Wu, 2025). Hence, H4 is accepted.

This discovery shows that agile workers are flexible and can quickly adjust to new customer requirements, technological advancements and project priorities. By enabling them to learn new skills, work effectively in teams, and adapt to technological advancements, their ability to do so contributes to project quality, timely delivery, and stakeholder satisfaction.

In the sense of Dynamic Capability Theory, employee agility is the ability of the organization to reconfiguration, which allows employees to change their routines and put new knowledge into practice (Teece, 2018).

This finding is supported by the studies conducted by Njeri Mugwe and Runo (2026) and Hans and Marebane (2023) which indicated that adaptability of employees is a major factor that could improve the project performance especially in knowledge driven projects and technology driven projects.

5.2.5 Discussion of H5: Moderating Effect of AI Adoption

H5: AI adoption moderates the relationship between agile leadership and project manager competency such that the relationship becomes stronger when AI adoption is high.

The results corroborate H5. Agile leadership and AI adoption have a positive, statistically significant interaction effect ($\beta = 0.157$, $t = 4.243$, $p < 0.001$, $f^2 = 0.063$). A positive beta coefficient suggests that there is a strengthening of the positive relationships between the agile leadership and project manager competency when using AI.

The relatively high t-value and p-value indicate that the moderating effect is statistically significant and the small effect size ($f^2 = 0.063$) implies that the use of AI offers significant incremental explanatory power (Arshad et al., 2024). Thus, H5 is allowed.

The discovery suggests that artificial intelligence technologies can boost the impact of agile leadership by offering project managers with superior decision support tools, forecasting, automated reporting and project data in real-time. This means agile leaders who are working in an AI enabled environment have the ability to build agile project managers' planning, coordination, monitoring and problem-solving skills.

The discovery adds to Dynamic Capability Theory by showing that AI is a technological enabling capability that enhances leadership capability to managerial capability as articulated by.

Such findings align with [Ameen et al. \(2024\)](#), [Chhetri \(2024\)](#), and [Wong et al. \(2024\)](#) who found that AI-based technologies can enhance managerial efficiency by aiding evidence-based decision making and digital project management ([Hall, 2025](#)).

In the context of software and IT companies, the results indicate that implementing agile leadership along with AI-powered project management tools leads to higher levels of managerial competence than agile leadership alone.

5.2.6 Discussion of H6: Mediating Role of Project Manager Competency

H6: Project manager competency mediates the relationship between agile leadership and employee agility.

The results support the acceptance of H6 as evident, the competency of project managers plays a significant mediating role between agile leadership and employee agility. The indirect effect was positive and statistically significant ($\beta = 0.310$, $t = 6.286$, $p < 0.001$, 95% CI = [0.215, 0.406]). The results of the bootstrap confidence interval procedure did not include zero indicating that the mediation effect is statistically significant ([Ahachmi et al., 2025](#)). Furthermore, this is the highest indirect effect recorded in the study, indicating the critical role of the project manager's competence in shaping the adaptability of the workforce through the leadership behaviors. So, H6 is accepted.

The discovery indicates that agile leadership is not a direct enabler of an agile workforce. Rather, agile leaders can foster agility in employees by building up skillful project managers who can coordinate, communicate, mediate conflicts, and offer ongoing learning opportunities. With competent project managers, the employees, in turn, become more adaptable, cooperative, and sensitive about the project needs.

In the view of Dynamic Capability Theory (DCT), agile leadership is the sensing capability and project manager competency is the seizing aspect, which means to transform the strategic direction into some action that supports the adaptability

of the workforce ([Dominiczewska, 2025](#)). The results thus indicate that managerial competency is an important tool in the transformation of the leadership competency to the employee competency level.

The findings align with the previous studies indicating that leadership indirectly affects the workforce's performance through its managerial skills and effective project coordination ([Bekele Desta and Lunga, 2025](#)).

The results suggest that organizations developing their agile skills need to invest in agile leadership, but also in structured project manager development programs to ensure employees are becoming as agile as possible and organizations are becoming as adaptable as possible.

5.2.7 Discussion of H7: Sequential Mediation of Project Manager Competency and Employee Agility

H7: Project manager competency and employee agility sequentially mediate the relationship between agile leadership and project success.

The empirical results confirm that H7 is supported: Agile Leadership positively affects Project Success and Employee Agility plays the sequential mediating role between the two. The sequential indirect effect was positive and statistically significant ($\beta = 0.085$, $t = 3.149$, $p = 0.002$, 95% CI = [0.038, 0.144]).

Given that the result of the bootstrap confidence interval does not include zero, the sequence of mediation is statistically supported ([Kotlarsky et al., 2020](#)). Thus, H7 is accepted.

This discovery shows that the agile leadership does not directly lead to project success, but rather helps in the process of developing capabilities. Agile leaders improve project manager competency and the competency of employees as a result. Agile employees then help to enhance project performance by being effective when customer needs change, technology evolves and project uncertainties arise. This is a sequential process that shows that project success depends on the coordinated management, managerial skill, and adaptability of individuals involved in

the project. The discovery offers robust evidence for Dynamic Capability Theory, which suggests that organizational performance arises from a series of actions: sensing, seizing and reconfiguring organizational resources ([Biswakarma and Bohora, 2025](#)).

Agile leadership – sensing function, project manager competency – seizing capability, employee agility – reconfiguration, project success – realization of capability.

This finding builds on previous studies that combined leadership and managerial capability and workforce agility into one explanatory model.

The present study differs from previous studies isolating these variables in their own right, in that it shows the combined effect of these variables on a project's success within a software and IT organization.

5.2.8 Discussion of H8: Moderated Sequential Mediation of AI Adoption

H8: Project manager competency and employee agility mediate the indirect sequential relationship between agile leadership and project success, when mediated by AI adoption.

The results support the H8 in which it has been found that the use of the AI has a significant effect on the sequential indirect relationship between agile leadership and project success, mediated by the competency of the project manager and agility of the employees.

The conditional indirect effect was positive and statistically significant ($\beta = 0.024$, $t = 2.486$, $p = 0.013$, 95% CI = [0.009, 0.047]).

The confidence interval for the moderated sequential mediation does not contain zero, indicating that the overall effect is statistically significant ([Ali, 2025](#)). So, H8 is acceptable.

The results showed that the relationship between agile leadership and the indirect effect was more robust as the level of AI use was greater in the organizations. AI technologies deliver project managers and workers with intelligent decision help

systems, predictive analytics, automation, knowledge sharing systems and real-time project data. These technological capabilities support managerial decision making, and help agile workers to complete their work more efficiently, which improves the entire capability conversion process and contributes to project success.

Adopting AI can be seen as a technological capability that improves the effectiveness of sensing, seizing, and reconfiguring processes, not a replacement of human capabilities, as per Dynamic Capability Theory (Sarstedt et al., 2021). This research shows that technological resources add value when combined with the kind of leadership, competence and flexibility of the workforce.

The findings align with the research conducted by Ameen et al. (2024); Chen et al. (2024) and Wong et al. (2024), which found the use of AI improves organizational agility, managerial effectiveness and project performance through capability development. The findings indicate that for Software/IT firms in Islamabad, the implementation of AI should go hand-in-hand with agile leadership development, skills improvement for project managers, and employee agility programs to ensure successful projects (Lin and Wu, 2025).

5.3 Theoretical Implications

The study advances Dynamic Capability Theory by converting the three elements of sensing, seizing and reconfiguring into project-management constructs. Agile leadership is about sensing and mobilization; project manager competency is about seizing; employee agility is about reconfiguration; AI adoption is about enabling capability of technology; project success is about capability realization. This mapping shows that, besides its ability to explain project success at the level of the broad firm strategy, DCT can explain success at the level of software/IT project professionals. Another contribution of the study is the demonstration of the sequential functioning of dynamic capabilities. The results indicate that leadership capability has more value on the strength of project manager competency and employee agility. This offers a process explanation rather than a list of capabilities, which are only single predictors of project success.

Finally, the moderation results reveal that the use of technology can enhance capability conversion, extending the DCT. AI adoption increases the significance of leadership and agility by offering information processing, technological routines, automation and decision support. Thus, thinking about AI as a means of enabling the value of human and managerial competences (Sarstedt et al., 2021).

5.4 Methodological Implications

The study demonstrates the usefulness of a four-wave cross sectional design in project-management and leadership research. Separating agile leadership, AI adoption, mediators, and project success across time reduces the risk that respondents answer all questions using the same immediate perception.

The study also illustrates the value of SmartPLS-style reporting for complex models involving mediation, sequential mediation, moderation, and conditional indirect effects. However, the measurement model also shows why researchers must carefully examine indicator reliability and AVE rather than reporting only significant structural paths.

5.5 Practical Implications

The practical implications of the study can be considered from the perspective of different stakeholders. For top management, there is a need to invest in agile leadership development, particularly in responsiveness, empowerment, technological awareness, flexible planning, and fast decision-making. For project managers, project-management knowledge, tools, conflict resolution, team-building, and decision-making skills should be strengthened through structured training and mentoring. HR managers can develop employee agility through cross-functional training, job rotation, technology upskilling, learning systems, and adaptive performance incentives. For technology leaders, AI tools should be integrated into project planning, monitoring, risk analysis, documentation, testing, and decision support rather than treating AI as a symbolic technology.

For policy stakeholders, capability development programs should be supported for software and IT firms, particularly in the areas of AI-enabled project management, agile leadership, and workforce agility. The practical message is that project success requires more than adopting agile terminology or AI tools. Firms need a coherent capability system in which leaders create adaptive direction, employees are supported in developing agility, project managers are equipped with the required skills, and technology is used meaningfully in project-related activities. Such an approach can help organizations build the capabilities required to respond effectively to changing project and technological requirements.

5.6 Limitations of the Study

First, the study is limited to software/IT project professionals operating in Islamabad. The results may not fully generalize to other cities, countries, industries, or non-project-based organizations. Second, the study used self-reported survey data.

Therefore, causal claims should be made carefully. Organizational names were anonymized, which protects confidentiality but limits the ability to compare firm-specific practices in detail ([Almaiah et al., 2022](#)).

5.7 Future Research Directions

Future research should replicate the model in other Pakistani technology hubs such as Lahore, Karachi, Peshawar, and Faisalabad to test whether the relationships remain stable across contexts. Comparative studies across South Asian countries could also examine whether regional institutional differences influence agile leadership, AI adoption, and project success.

Future studies may use multi-source data by collecting leadership ratings from employees, project manager competency ratings from supervisors, and project success data from project records or clients. This would reduce reliance on single-source perceptions. Researchers may also test the model using longitudinal project

data over a longer period to better capture changes in capability development and project outcomes.

Future research can also refine measurement by validating the scales in the Pakistani software/IT context through confirmatory factor analysis, higher-order construct modeling, or item-purification procedures approved by supervisors. AI adoption can be examined in greater detail by separating generative AI, analytics AI, automation tools, and project-management AI systems.

5.8 Conclusion

This thesis examined the relationship between agile leadership and project success through the sequential mediating roles of project manager competency and employee agility, with AI adoption as a moderating condition. Grounded in Dynamic Capability Theory, the study showed that project success in software/IT organizations depends on the conversion of leadership capability into managerial capability and workforce agility. Agile leadership had positive effects on project manager competency, employee agility, and project success. Project manager competency and employee agility mediated the agile leadership-project success relationship, and the sequential indirect effect was statistically supported. AI adoption strengthened the agile leadership-project manager competency relationship and the employee agility-project success relationship. The conditional indirect effect was stronger at higher levels of AI adoption. Overall, the findings suggest that Islamabad-based software/IT organizations can improve project success by aligning agile leadership, project manager development, employee agility, and AI-enabled project practices into one coherent capability system.

Bibliography

- Abaddi, S. (2025). Factors and moderators influencing artificial intelligence adoption by jordanian MSMEs. *Management & Sustainability: An Arab Review*, 4(1):47–73.
- Abu-Alhaija, A. S. (2019). From epistemology to structural equation modeling: An essential guide in understanding the principles of research philosophy in selecting the appropriate methodology. *Australian Journal of Basic and Applied Sciences*, 13(9):122–128.
- Ahachmi, M., Lahfidi, A., Rhazzane, S., and Tamanine, R. (2025). Dynamic capability theory as a foundation for organizational resilience: Key factors influencing gastronomic firms in the COVID-19 context. *International Journal of Accounting Finance Auditing Management and Economics*, 6(1):23–44.
- Ahmadi Eftekhari, N., Mani, S., Bakhshi, J., and Mani, S. (2022). Project manager competencies for dealing with socio-technical complexity: A grounded theory construction. *Systems*, 10(5):161.
- Ahmed, A. (2016). *Software Project Management: A Process-Driven Approach*. CRC Press.
- Aithal, P. and AS, V. R. (2024). Infosys: A case study of it service evolution, technology adoption & innovation strategies. *Poornaprajna International Journal of Teaching & Research Case Studies (PIJTRCS)*, 1(1):202–254.
- Alfons, A., Ateş, N. Y., and Groenen, P. J. (2022). A robust bootstrap test for mediation analysis. *Organizational Research Methods*, 25(3):591–617.

- Ali, D. T. M., Elashry, D. M. M., and Nemr, D. M. A. A. (2025). Agility drivers and agility capabilities: The mediating role of agile hr practices—insights from steel industry in egypt. *()*, 45(83):297–352.
- Ali, S. (2025). It industry development in south asia: Lessons for pakistan. *Journal of Pakistan Administration*, 46(2):72–103.
- Aliu, F., Kutllovci, E., and Berisha Qehaja, A. (2025). Identifying key managerial competencies in smes: A post-2020 systematic literature review. *International Journal of Organizational Analysis*.
- Allammari, Y., Taqi, A., and El Morabit, N. (2025). Entrepreneurial orientation and sme performance: A sequential mediation analysis of market and learning orientation. *Journal of Applied Structural Equation Modeling*, 9(2):1–30.
- Almaiah, M. A., Alfaisal, R., Salloum, S. A., Hajjej, F., Shishakly, R., Lutfi, A., Alrawad, M., Al Mulhem, A., Alkhdour, T., and Al-Marroof, R. S. (2022). Measuring institutions’ adoption of artificial intelligence applications in online learning environments: Integrating the innovation diffusion theory with technology adoption rate. *Electronics*, 11(20):3291.
- Alqarni, K., Agina, M. F., Khairy, H. A., Al-Romeedy, B. S., Farrag, D. A., and Abdallah, R. M. (2023). The effect of electronic human resource management systems on sustainable competitive advantages: The roles of sustainable innovation and organizational agility. *Sustainability*, 15(23):16382.
- Alvarenga, J. C., Branco, R. R., Guedes, A. L. A., Soares, C. A. P., and Silva, W. d. S. e. (2020). The project manager core competencies to project success. *International Journal of Managing Projects in Business*, 13(2):277–292.
- Ameen, N., Tarba, S., Cheah, J. H., Xia, S., and Sharma, G. D. (2024). Coupling artificial intelligence capability and strategic agility for enhanced product and service creativity. *British Journal of Management*, 35(4):1916–1934.
- Arroyo, C. (2026). Artificial intelligence-enabled human resource management: Integrating dynamic capabilities theory and stakeholder theory for sustainable

- organizational performance. *Business, Technology & Innovation Studies Journal*, 2(2).
- Arshad, N., Ahmad, W., and Manzoor, K. (2024). Unleashing the potential of pakistan's it industry: Building for massive software export growth.
- Awwad, M. S. (2025). Dynamic capabilities, intellectual capital and organisational performance: Mediation and moderation effects. *Journal of Intellectual Capital*, 26(3):738–760.
- Bajcar, B., Babiak, J., Klaus-Rosińska, A., Iwko, J., and Kuchta, D. (2026). Shared leadership and project success: The mediational role of individual-and team-related factors. *Plos one*, 21(2):e0342268.
- Barros, L., Tam, C., and Varajão, J. (2024). Agile software development projects—unveiling the human-related critical success factors. *Information and Software Technology*, 170:107432.
- Bekele Desta, K. and Lunga, M. (2025). Segmenting the impact of organizational structure and leadership on project resilient and project success in the ethiopian construction industry: A FIMIX-PLS & PLS-POS approach.
- Berg, H. and Ritschel, J. D. (2023). The characteristics of successful military IT projects: A cross-country empirical study. *International Journal of Information Systems and Project Management*, 11(2):25–44.
- Bhatti, B. M., Mubarak, S., and Nagalingam, S. (2021). Information security risk management in IT outsourcing—a quarter-century systematic literature review. *Journal of Global Information Technology Management*, 24(4):259–298.
- Biswakarma, G. and Bohora, B. (2025). Dynamic capabilities and organizational performance: The mediating role of organizational resilience in IT sector. *Future Business Journal*, 11(1):173.
- Bushuyeva, N., Bushuiev, D., and Bushuieva, V. (2019). Agile leadership of managing innovation projects. *Innovative Technologies and Scientific Solutions for Industries*, (4 (10)):77–84.

- Cao, W., van der Wal, R. C., and Taris, T. W. (2021). The benefits of forgiveness at work: A longitudinal investigation of the time-lagged relations between forgiveness and work outcomes. *Frontiers in Psychology*, 12:710984.
- Cavusgil, S. T. and Deligonul, S. Z. (2025). Dynamic capabilities framework and its transformative contributions. *Journal of International Business Studies*, 56(1):33–42.
- Chen, J. and Tajdini, S. (2025). A moderated model of artificial intelligence adoption in firms and its effects on their performance. *Information Technology and Management*, 26(3):407–419.
- Chen, M., Sun, X., and Liu, M. (2025). Critical success factors in agile-based digital transformation projects. *Systems*, 13(8):694.
- Chen, W., Men, Y., Fuster, N., Osorio, C., and Juan, A. A. (2024). Artificial intelligence in logistics optimization with sustainable criteria: A review. *Sustainability*, 16(21):9145.
- Chew, H. S. J. and Achananuparp, P. (2022). Perceptions and needs of artificial intelligence in health care to increase adoption: Scoping review. *Journal of Medical Internet Research*, 24(1):e32939.
- Chhetri, K. B. (2024). Applications of artificial intelligence and machine learning in food quality control and safety assessment. *Food Engineering Reviews*, 16(1):1–21.
- Choga, N. N. (2019). The effects of monetary and non-monetary incentives on respondent attrition in longitudinal survey.
- Coutts, J. J. and Hayes, A. F. (2023). Questions of value, questions of magnitude: An exploration and application of methods for comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 55(7):3772–3785.
- Creswell, J. W. and Creswell, J. D. (2017). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. SAGE Publications.

- Cristofaro, M., Helfat, C. E., and Teece, D. J. (2025). Adapting, shaping, evolving: Refocusing on the dynamic capabilities–environment nexus. *Academy of Management Collections*, 4(1):20–46.
- Dacre, N. and Kockum, F. (2022). Strategic project leadership: The case for integrating systems thinking and artificial intelligence.
- Dastgeer, G., ur Rehman, A., and Asghar, M. A. (2020). Selection and use of mediation testing methods; application in management sciences. *Business & Economic Review*, 12(3):71–96.
- Daud, W., Anwar, J., and Abbasi, M. M. (2024). The impact of project management approaches on project performance: An analysis of IT sector of pakistan. *The Regional Tribune*, 3(1):338–355.
- Dawes, J. (2008). Do data characteristics change according to the number of scale points used? an experiment using 5-point, 7-point and 10-point scales. *International Journal of Market Research*, 50(1):61–104.
- de Rezende, L. B. and Blackwell, P. (2019). Project management competency framework. *Iberoamerican Journal of Project Management*, 10(1):34–59.
- Dominiczewska, M. (2025). Dynamic capabilities and firm performance: Empirical evidence from organisations in poland. *Zeszyty Naukowe. Organizacja i Zarządzanie/Politechnika Śląska*.
- Eisner, N. L., Murray, A. L., Eisner, M., and Ribeaud, D. (2019). A practical guide to the analysis of non-response and attrition in longitudinal research using a real data example. *International Journal of Behavioral Development*, 43(1):24–34.
- Etemad, M., Nazari-Shirkouhi, S., Chaharsooghi, S. K., and Govindan, K. (2026). Relationship between lean, agile, resilient and green paradigm and sustainable supply chain performance: An empirical investigation. *Industrial Management & Data Systems*, pages 1–36.
- Faulconbridge, I. and Ryan, M. (2026). *Managing Complex Technical Projects: A Systems Engineering Approach*. Artech House.

- Fienberg, S. E. and Slavković, A. B. (2025). Data privacy and confidentiality. In *International Encyclopedia of Statistical Science*, pages 615–619. Springer.
- Florea, N. V., Croitoru, G., Andreiana, V. A., Diaconeasa, A.-A., and Croitoru, M. B. (2026). From social values to green capabilities: Perceived linkages toward organisational sustainability. *Sustainability*, 18(2):1063.
- Fuentes-Peñailillo, F., Gutter, K., Vega, R., and Silva, G. C. (2024). Transformative technologies in digital agriculture: Leveraging internet of things, remote sensing, and artificial intelligence for smart crop management. *Journal of Sensor and Actuator Networks*, 13(4):39.
- Gama, F. and Magistretti, S. (2025). Artificial intelligence in innovation management: A review of innovation capabilities and a taxonomy of ai applications. *Journal of Product Innovation Management*, 42(1):76–111.
- Gemünden, H. G., Lehner, P., and Kock, A. (2018). The project-oriented organization and its contribution to innovation. *International Journal of Project Management*, 36(1):147–160.
- Ghorbani, A. (2023). A review of successful construction project managers’ competencies and leadership profile. *Journal of Rehabilitation in Civil Engineering*, 11(1):76–95.
- Grover, P., Kar, A. K., and Dwivedi, Y. K. (2022). Understanding artificial intelligence adoption in operations management: Insights from the review of academic literature and social media discussions. *Annals of Operations Research*, 308(1):177–213.
- Hair, J. F., Babin, B. J., Ringle, C. M., Sarstedt, M., and Becker, J.-M. (2025). Covariance-based structural equation modeling (CB-SEM): A SmartPLS 4 software tutorial. In *SmartPLS 4 Software Tutorial*. Springer.
- Hall, R. D. (2025). *Relationship Between Dynamic Capabilities Characteristics and Organizational Performance in Specialty Health Care Organizations*. PhD thesis, Walden University.

- Hans, R. and Marebane, S. (2023). Are software projects evaluated using software teams' success criteria? a systematic literature review. *Procedia Computer Science*, 219:1599–1608.
- Hashem, G. and Aboelmaged, M. (2025). The dynamic interplay of knowledge management, innovation and learning capabilities in digital supply chain adoption: A mediation-moderation model. *Benchmarking: An International Journal*, 32(8):2911–2941.
- Heijstek, A. (2023). *Bridging Theory and Practice: Insights into Practical Implementations of Security Practices in Secure DevOps and CI/CD Environments*. PhD thesis, Universiteit van Amsterdam.
- Hmaidan, R. A., ur Rehman, H. I., Akram, I., and Zuagaili, A. A. M. (2025). Leveraging artificial intelligence (AI) capability and sustainability orientation for sustainable performance: Mediating role of green innovation in malaysian manufacturing sector. *Sustainable Trends and Business Research*, 3(1):22–35.
- Hung, M.-T., Yu, Z., Hung, L.-C., and Smith, C. S. (2026). Growth mindset and learning engagement: A sequential–parallel mediation model of academic self-efficacy and grit's dual dimensions. *Social Psychology of Education*, 29(1):60.
- Irfan, M., Khan, S. Z., Hassan, N., Hassan, M., Habib, M., Khan, S., and Khan, H. H. (2021). Role of project planning and project manager competencies on public sector project success. *Sustainability*, 13(3):1421.
- Jahangir, S., Xie, R., Iqbal, A., and Hussain, M. (2025). The influence of sustainable human resource management practices on logistics agility: The mediating role of artificial intelligence. *Sustainability*, 17(7):3099.
- Jakobsson, K. and Samimian, T. (2023). Agile leadership in new software development contexts. Master's thesis, Chalmers University of Technology.
- Kaabachi, B., Despraz, J., Meurers, T., Otte, K., Halilovic, M., Kulynych, B., Prasser, F., and Raisaro, J. L. (2025). A scoping review of privacy and utility metrics in medical synthetic data. *NPJ Digital Medicine*, 8(1):60.

- Kathuria, S., Grover, A., Perego, V. M. E., Mattoo, A., and Banerjee, P. (2019). *Unleashing E-Commerce for South Asian Integration*. World Bank Publications.
- Kaya, Y. (2023). Agile leadership from the perspective of dynamic capabilities and creating value. *Sustainability*, 15(21):15253.
- Khan, A. N., Jabeen, F., Mehmood, K., Soomro, M. A., and Bresciani, S. (2023). Paving the way for technological innovation through adoption of artificial intelligence in conservative industries. *Journal of Business Research*, 165:114019.
- Khan, A. N. and Kwan, H. K. (2025). AI, agility, and environmental performance: A new framework for construction project managers. *Journal of Construction Engineering and Management*, 151(3):04025003.
- Khanagha, S., Volberda, H. W., Alexiou, A., and Annosi, M. C. (2022). Mitigating the dark side of agile teams: Peer pressure, leaders' control, and the innovative output of agile teams. *Journal of Product Innovation Management*, 39(3):334–350.
- Khosravi, H., Shibani, A., Jovanovic, J., Pardos, Z. A., and Yan, L. (2025). Generative AI and learning analytics: Pushing boundaries, preserving principles. *Journal of Learning Analytics*, 12(1):1–11.
- Kim, H.-J., Park, S., Park, S.-H., Heo, Y. W., Chang, B.-S., Lee, C.-K., and Yeom, J. S. (2017). The significance of frailty in the relationship between socioeconomic status and health-related quality of life in the korean community-dwelling elderly population: Mediation analysis with bootstrapping. *Quality of Life Research*, 26(12):3323–3330.
- Koo, M. and Yang, S.-W. (2025). Likert-type scale. *Encyclopedia*, 5(1):18.
- Kotlarsky, J., Van den Hooff, B., and Geerts, L. (2020). Under pressure: Understanding the dynamics of coordination in IT functions under business-as-usual and emergency conditions. *Journal of Information Technology*, 35(2):94–122.
- Kuzior, A., Sira, M., and Brożek, P. (2023). Use of artificial intelligence in terms of open innovation process and management. *Sustainability*, 15(9):7205.

- Langholf, V. and Wilkens, U. (2021). Agile project management, new leadership roles and dynamic capabilities—insight from a case study analysis. *Journal of Competences, Strategy & Management*, 11:1–18.
- Li, J. and Jin, X. (2024). The impact of artificial intelligence adoption intensity on corporate sustainability performance: The moderated mediation effect of organizational change. *Sustainability*, 16(21):9350.
- Lin, X. and Wu, D. (2025). AI technology adoption, knowledge sharing, and manufacturing firms’ innovation performance: The moderating effect of absorptive capacity. *IEEE Transactions on Engineering Management*.
- Lindner, J. R. and Lindner, N. (2024). Interpreting likert type, summated, uni-dimensional, and attitudinal scales: I neither agree nor disagree, likert or not. *Advancements in Agricultural Development*, 5(2):152–163.
- Lynn, P. (2017). From standardised to targeted survey procedures for tackling non-response and attrition. *Survey Research Methods*.
- Malhotra, G. and Ramalingam, M. (2025). Perceived anthropomorphism and purchase intention using artificial intelligence technology: Examining the moderated effect of trust. *Journal of Enterprise Information Management*, 38(2):401–423.
- Malik, S. J., Ahmed, W. S., Awan, T. M., Farooq, N., and Khalid, M. (2023). Linking agile methodology and transformational leadership to project success through interplay of team building. In *Agile Leadership for Industry 4.0*, pages 309–330. Apple Academic Press.
- Margalina, V.-M., Kreienbaum, C., Hair, J. F., Becker, J.-M., and Ringle, C. M. (2026). Multiple linear and logistic regression analysis: A SmartPLS 4 software tutorial. *Journal of Marketing Analytics*, 14(2):709–726.
- Mirsharipova, O. (2026). ICT sector: Outsourcing in central asia: An exploratory study in uzbekistan. Master’s thesis.

- Mmieh Kwakye, R., Qu, L., and Wang, Y. (2025). Sustainability practices and complementor innovation capability: A PLS-SEM serial mediation model of market pressure and strategic alliances. *Business Process Management Journal*, pages 1–23.
- Monserrat, M., Mas, A., and Mesquida, A. L. (2025). A study of factors that influence the software project success. *Journal of Software: Evolution and Process*, 37(2):e2735.
- Muduli, A. (2017). Workforce agility: Examining the role of organizational practices and psychological empowerment. *Global Business and Organizational Excellence*, 36(5):46–56.
- Muduli, A. and Choudhury, A. (2025). Exploring the role of workforce agility on digital transformation: A systematic literature review. *Benchmarking: An International Journal*, 32(2):492–512.
- Mulongo, A. (2026). The grand problems of complex information systems projects and the grand limits of existing methodologies. Available at SSRN 6890778.
- Munawaroh, M., Khaerunnisa, R., Galuh, A., and Maulana, A. (2026). From competence to agility: A systematic review of digital competence and employee agility effects on employee performance in digital transformation era. *PANDITA: Interdisciplinary Journal of Public Affairs*, 9(1):92–107.
- Naim, M. F., Sahai, S., and Elembilassery, V. (2024). Does empowering leadership enhance employee agility? a serial mediation model. *Evidence-based HRM: A Global Forum for Empirical Scholarship*.
- Nalavade, A. V. (2025). Agile project management and the future of r&d.
- Nareswari, F. and Astuti, R. J. (2025). A scientometric review of the relationship between learning agility and work engagement in modern management context. *Asian Management and Business Review*, pages 196–215.

- Nayak, L., Malik, P., Meher, J. R., and Patel, G. (2026). Developing competencies of gen z: Role of organizational learning culture and learning agility. *Journal of Organizational Effectiveness: People and Performance*, 13(2):278–296.
- Neto, J. d. S. A., Penha, R., da Silva, L. F., and Scafuto, I. C. (2022). The importance of leadership in agile projects: Systematic literature review. *Research, Society and Development*, 11(5):e44511528117–e44511528117.
- Nitzl, C., Roldan, J. L., and Cepeda, G. (2016). Mediation analysis in partial least squares path modeling: Helping researchers discuss more sophisticated models. *Industrial Management & Data Systems*, 116(9):1849–1864.
- Njeri, R. (2022). Effect of employee agility on organizational performance (a case study of the state department for labour, kenya). *Journal of Human Resource and Leadership*.
- Njeri Mugwe, J. and Runo, S. (2026). Mixed methods research designs. In *Research Methodology in Agricultural Sciences*, pages 353–374. Springer.
- Ostadi, B., Barrani, L., and Aghdasi, M. (2024). Developing a strategic roadmap towards integration in industry 4.0: A dynamic capabilities theory perspective. *Technological Forecasting and Social Change*, 208:123679.
- Padgett, R. N., Bradshaw, M., Chen, Y., Cowden, R. G., Jang, S. J., Kim, E. S., Shiba, K., Johnson, B. R., and VanderWeele, T. J. (2025). Analytic methodology for demographic variation analyses for wave 1 of the global flourishing study. *BMC Global and Public Health*, 3(1):28.
- Pauwels, K., Mahon, C., Kim, J., and De Cremer, D. (2026). Managing the dual challenge of ai adoption: An integrative framework for employee and customer success. *Business Horizons*.
- Quansah, E., Hartz, D. E., and Salipante, P. (2022). Adaptive practices in smes: Leveraging dynamic capabilities for strategic adaptation. *Journal of Small Business and Enterprise Development*, 29(7):1130–1148.

- Raj, R., Kumar, V., and Verma, V. K. (2026). Navigating global supply chain opportunities in it outsourcing and offshoring. *Journal of Enterprise Information Management*, pages 1–27.
- Rane, N., Choudhary, S. P., and Rane, J. (2024). Acceptance of artificial intelligence: Key factors, challenges, and implementation strategies. *Journal of Applied Artificial Intelligence*, 5(2):50–70.
- Rizka Ibdyanti, D., Zukhrina Oktaviani, C., and Husin, S. (2024). Multiple regression analysis to the influence of communication management on project success. *E3S Web of Conferences*.
- Rosamilha, N. J. and da Silva, L. F. (2025). The project manager of tomorrow: Knowledge and competencies for a globalised and digital future. In *Project Management for European, Asian and African Practitioners—Theory and Technique Examples in Selected Professions*, pages 43–58. Springer.
- Ruitenbunrg, Y., Lee, M., IJsselsteijn, W., and Markopoulos, P. (2026). Beyond the signature: Addressing informed consent challenges in dementia technology research. *Proceedings of the ACM on Human-Computer Interaction*, 10(2):1–29.
- Ruiz-Rojas, L. I., Salvador-Ullauri, L., and Acosta-Vargas, P. (2024). Collaborative working and critical thinking: Adoption of generative artificial intelligence tools in higher education. *Sustainability*, 16(13):5367.
- Rumman, M. A. A. and Hatamleh, A. A. (2025). Enhancing project efficiency and business overall performance through measuring the impact of scm system, employee skills, and project agility.
- Saputra, M. H., Utomo, M. N., Ariansyah, K., Wismayanti, Y. F., and Ansyah, R. H. A. (2024). Small and medium-sized enterprises dynamic capabilities and competitive advantage: The mediating effect of digitalization. *Entrepreneurial Business and Economics Review*, 12(3):41–67.
- Sarstedt, M. and Cheah, J.-H. (2019). Partial least squares structural equation modeling using SmartPLS: A software review. Springer.

- Sarstedt, M., Ringle, C. M., and Hair, J. F. (2021). Partial least squares structural equation modeling. In *Handbook of Market Research*, pages 587–632. Springer.
- Schuler, M. S., Coffman, D. L., Stuart, E. A., Nguyen, T. Q., Vegetabile, B., and McCaffrey, D. F. (2025). Practical challenges in mediation analysis: A guide for applied researchers. *Health Services and Outcomes Research Methodology*, 25(1):57–84.
- Seppänen, S., Ukko, J., and Saunila, M. (2025). Understanding determinants of digital transformation and digitizing management functions in incumbent smes. *Digital Business*, 5(1):100106.
- Seraj, A. H. A., Hasanein, A. M., Al-Romeedy, B. S., and Elziny, M. N. (2025). Redefining the digital frontier: Digital leadership, ai, and innovation driving next-generation tourism and hospitality. *Administrative Sciences*, 15(9):369.
- Setiawan, R. and Rahman, T. A. (2025). Critical success factors for the e-business software projects in indonesia and its prediction model. In *2025 1st International Conference on Emerging Trends in Information Systems and Informatics (ICETISI)*.
- Shaban, Y., Soliman, H., and García, V. T. (2026). The mediation role played by information processing capabilities in the relationship between ai adoption and marketing performance: a non-linear relationship. *Strategic Business Research*, page 100094.
- Sherani, Zhang, J., Shehzad, M. U., Ali, S., and Cao, Z. (2025). Unlocking digital innovation: A moderated-mediation approach exploring the knowledge creation processes, it-enabled capabilities and absorptive capacity in software smes. *Business Process Management Journal*, 31(1):170–201.
- Siddiqui, M. and Sareen, P. (2026). AI-powered competency assessment for agile and sustainable human capital development. In *Artificial Intelligence for Sustainable Economy and Business*, pages 361–380. Springer.

- Sumadireja, G. C., Dachyar, M., Farizal, F., Ma'aram, A., and Park, J. J. (2025). Identifying key assessment factors for human capital agility and leadership agility. *Sustainability*, 17(9):3849.
- Sun, W., Chen, K., and Mei, J. (2024). Integrating the resource-based view and dynamic capabilities: A comprehensive framework for sustaining competitive advantage in dynamic markets. *EPRA International Journal of Economic and Business Review*, 12(9):1–8.
- Syamsir, S., Saputra, N., and Mulia, R. A. (2025). Leadership agility in a VUCA world: A systematic review, conceptual insights, and research directions. *Cogent Business & Management*, 12(1):2482022.
- Tanujaya, B., Prahmana, R. C. I., and Mumu, J. (2022). Likert scale in social sciences research: Problems and difficulties. *FWU Journal of Social Sciences*, 16(4):89–101.
- Tarigan, S. T. (2025). An integrated framework of agile leadership, trust, and AI implementation: Impacts on organizational capabilities and performance. October 28, 2025.
- Teece, D. J. (2018). Business models and dynamic capabilities. *Long Range Planning*, 51(1):40–49.
- Tiong, P., Adi, Y., Nuryadin, A., Soemaryo, P., and Irwan, A. (2026). Agile leadership in digital work systems: Psychological pathways to innovation and employee performance. *Jurnal Aplikasi Manajemen*, 24(1).
- Tominc, P., Oreški, D., and Rožman, M. (2023). Artificial intelligence and agility-based model for successful project implementation and company competitiveness. *Information*, 14(6):337.
- Ubaidillah, A., Arifin, Z., Mawardi, M. K., and Noerman, T. (2026). Mapping the link between environmental dynamism and organizational performance: A systematic literature review. *Cogent Business & Management*, 13(1):2658763.

- Uddin, M. R. (2025). AI-enabled project management and IT integration: A systematic review of digital transformation, governance, and leadership models. *Pacific Journal of Advanced Engineering Innovations*, 2(2):59–69.
- Utomwen, M. (2024). *Examining the Impact of Project Risk Management and Project Complexity on Project Success in the United States: A Quantitative Regression Study*. PhD thesis, Capella University.
- Varajão, J., Marques, R. P., and Trigo, A. (2022). Project management processes—impact on the success of information systems projects. *Informat-ica*, 33(2):421–436.
- Varshney, D. and Varshney, N. K. (2025). Does empowering leadership behavior affect employee performance? the mediating role of workforce agility. *International Journal of Productivity and Performance Management*, 74(4):1425–1451.
- Verenych, O., Wolff, C., Bushuyev, S., Bondar, O., and Voitenko, O. (2022). Hybrid competencies model for managing innovation projects. In *ITPM*.
- Vignarajah, I. (2025). The current opportunities and challenges in business process outsourcing: Multi-regional perspective.
- Wafa, R., Khan, M. Q., Malik, F., Abdusalomov, A. B., Cho, Y. I., and Odarchenko, R. (2022). The impact of agile methodology on project success, with a moderating role of person’s job fit in the IT industry of pakistan. *Applied Sciences*, 12(21):10698.
- Wamba-Taguimdje, S.-L., Fosso Wamba, S., Kala Kamdjoug, J. R., and Tchatchouang Wanko, C. E. (2020). Influence of artificial intelligence (AI) on firm performance: The business value of AI-based transformation projects. *Business Process Management Journal*, 26(7):1893–1924.
- Wang, H.-J., Li, P., Bauer, T. N., and Erdogan, B. (2024). Patient mistreatment and new nurse adjustment: The role of rumination and work engagement. *Human Relations*, 77(12):1755–1783.

- Waqar, A., Othman, I., and Pomares, J. C. (2023). Impact of 3d printing on the overall project success of residential construction projects using structural equation modelling. *International Journal of Environmental Research and Public Health*, 20(5):3800.
- Watema, J. and Tulirinya, J. (2021). Project implementation, risk management practices and project success.
- Whyte, J. and Mottee, L. (2022). Projects as interventions. *International Journal of Project Management*, 40(8):934–940.
- Wijayarathne, N., Gunawan, I., and Schultmann, F. (2026). An integrated framework of dynamic capabilities, digital transformation, and organizational resilience: A multimethod qualitative study in the construction sector. *Journal of Construction Engineering and Management*, 152(9):04026151.
- Wong, K. K.-K. (2013). Partial least squares structural equation modeling (PLS-SEM) techniques using SmartPLS. *Marketing Bulletin*, 24(1):1–32.
- Wong, L.-W., Tan, G. W.-H., Ooi, K.-B., Lin, B., and Dwivedi, Y. K. (2024). Artificial intelligence-driven risk management for enhancing supply chain agility: A deep-learning-based dual-stage PLS-SEM-ANN analysis. *International Journal of Production Research*, 62(15):5535–5555.
- Zahra, S. A., Petricevic, O., and Luo, Y. (2022). Toward an action-based view of dynamic capabilities for international business. *Journal of International Business Studies*, 53(4):583–600.
- Zhang, F., Abdullah, N. A. S., and Rosli, M. M. (2025). Analysis of critical success factors of agile software projects based on the fuzzy delphi method. *Engineering, Technology & Applied Science Research*, 15(1):19424–19433.

Appendix-A



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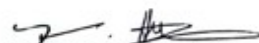
RESEARCH ETHICS COMMITTEE CERTIFICATE OF REVIEW AND SUPPORT

This is to certify that Project titled: *"Agile Leadership and Project Success: Sequential Mediation of Project Manager's competency and Employee Agility and Moderated Mediation of AI Adoption"* submitted by MS scholar *Hamza Kiani, MPM-243023* and supervised by: *Dr. Ishfaq Khan* reviewed by the Research Ethics Committee of Faculty of Management and Social Science, meets the requirements of the American Psychological Association's Ethical guidelines for Human Research and is **REVIEWED** and **APPROVED** by Research Ethics Committee of Faculty of Management and Social Sciences.

It is the Scholar's responsibility to ensure that all researchers associated with this project are aware of the conditions of approval and which documents have been approved.

The Scholar is required to notify the Research Ethics Committee in case of any amendment in the project, specifically:

- Any significant change to the project and the reason for that change, including an indication of ethical implications (if any)
- Serious adverse effects on participants and the actions taken to address those effects
- Any other unforeseen events or unexpected developments that merit notification
- The inability of the Principal Investigator to continue in that role, or any other change in research personnel involved in the project
- A delay of more than 12 months in the commencement of the project
- Termination or closure of the project.


Dr. Zunnoorain Khan

Convener, Research Ethics Committee
Faculty of Management and Social Sciences
Capital University of Science and Technology
Islamabad

Appendix-B

Demographic Profile

Please tick the option that best describes you and your organization/project.

Sr. No.	Question	Options
1	Gender	☐ Male ☐ Female ☐ Prefer not to say
2	Age	☐ 18-24 years ☐ 25-34 years ☐ 35-44 years ☐ 45-54 years ☐ 55 years and above
3	Highest Qualification	☐ Diploma ☐ Bachelor ☐ Master ☐ MS/M.Phil ☐ PhD ☐ Other
4	Current Position/Designation	☐ Project Manager ☐ Project Coordinator ☐ Program Manager ☐ Project Team Member ☐ Director/CEO/BOD ☐ Other
5	Project-Related Experience	☐ 1-5 years ☐ 6-10 years ☐ 11-15 years ☐ 16-20 years ☐ More than 20 years
6	Organization Type	☐ Public sector organization ☐ Private organization ☐ NGO/INGO/CBO ☐ Educational institution ☐ Other

Sr. No.	Question	Options
7	Organization Size	☐ Less than 50 employees ☐ 50-250 employees ☐ 251-500 employees ☐ More than 500 employees
8	Sector/Industry	☐ IT/Technology ☐ Services ☐ Other
9	Project Type	☐ Development project ☐ Construction project ☐ IT/digital project ☐ Research project ☐ Community/social project ☐ Other
10	Have you worked on or supervised at least one project?	☐ Yes ☐ No

Agile Leadership Scale

Sr. No.	Question	SA	A	N	D	SD
1	AL1: My leader has a strategic vision to achieve the goals of our organization.	1	2	3	4	5
2	AL2: My leader creates a suitable working environment for employees to develop creativity and discovery-oriented behavior.	1	2	3	4	5
3	AL3: My leader assigns the right person to the right job at the right time.	1	2	3	4	5

Sr. No.	Question	SA	A	N	D	SD
4	AL4: My leader gives importance to short-term goals to increase organizational performance.	1	2	3	4	5
5	AL5: The incentives and bonuses given by my leader positively affect employee behavior.	1	2	3	4	5
6	AL6: My leader ensures that employees understand why they are doing their assigned work.	1	2	3	4	5
7	AL7: My leader guides subordinates through actions rather than only words.	1	2	3	4	5
8	AL8: My leader rewards innovative ideas and practices.	1	2	3	4	5
9	AL9: My leader motivates subordinates to perform better.	1	2	3	4	5
10	AL10: My leader provides a high-quality work environment, social support, and job security to subordinates.	1	2	3	4	5
11	AL11: My leader ensures and develops cooperation among departments in the organization.	1	2	3	4	5
12	AL12: My leader includes subordinates in decision-making processes from the beginning to the delivery of a product or service.	1	2	3	4	5

Sr. No.	Question	SA	A	N	D	SD
13	AL13: My leader rewards team performance rather than only individual performance.	1	2	3	4	5
14	AL14: My leader gives importance to teamwork rather than individuality.	1	2	3	4	5
15	AL15: My leader develops subordinates through an effective feedback culture.	1	2	3	4	5
16	AL16: My leader allows employees at any level to demonstrate leadership on an issue.	1	2	3	4	5
17	AL17: My leader has a strong ability to persuade subordinates.	1	2	3	4	5
18	AL18: My leader has sufficient up-to-date technological knowledge to follow market trends.	1	2	3	4	5
19	AL19: My leader reaches subordinates quickly by using social media and new technology-based communication channels.	1	2	3	4	5
20	AL20: My leader prepares the organization in advance for environmental and technological changes.	1	2	3	4	5
21	AL21: My leader delegates authority to field experts to enable quick decision-making.	1	2	3	4	5

Sr. No.	Question	SA	A	N	D	SD
22	AL22: My leader makes flexible plans to produce different products, services, or project outputs.	1	2	3	4	5
23	AL23: My leader supports flexibility in producing different amounts of products or services according to technological and environmental changes.	1	2	3	4	5
24	AL24: My leader supports flexible personnel exchange between departments or teams under human resource policies.	1	2	3	4	5
25	AL25: My leader allows subordinates to be flexible about their working hours when needed.	1	2	3	4	5
26	AL26: My leader does not insist that subordinates do work they do not believe in.	1	2	3	4	5
27	AL27: My leader gives importance to delivering products or services to customers as soon as possible.	1	2	3	4	5
28	AL28: Decision-making speed in the work or production process is high under my leader.	1	2	3	4	5
29	AL29: My leader acts quickly to produce outputs that are demanded by the market and to bring them to the market.	1	2	3	4	5

Sr. No.	Question	SA	A	N	D	SD
30	AL30: My leader senses environmental and technological changes.	1	2	3	4	5
31	AL31: My leader has the knowledge, skills, and ability to adapt new technological products or services to the organization.	1	2	3	4	5
32	AL32: My leader strives to respond to changes in customer expectations and demands as soon as possible.	1	2	3	4	5

Artificial Intelligence Adoption Scale

Sr. No.	Question	SA	A	N	D	SD
1	AIA1: Our organization deploys advanced technologies, such as artificial intelligence, in its operations.	1	2	3	4	5
2	AIA2: Our organization adopts artificial intelligence for making the right strategic decisions.	1	2	3	4	5
3	AIA3: Our organization uses artificial intelligence to design products, services, or project solutions.	1	2	3	4	5

Sr. No.	Question	SA	A	N	D	SD
4	AIA4: Our organization has a continuous process for adopting next-generation technologies to achieve competitive performance.	1	2	3	4	5
5	AIA5: Our organization readily accepts proven technological tools, such as artificial intelligence, for further innovation.	1	2	3	4	5

Project Manager Competencies Scale

Sr. No.	Question	SA	A	N	D	SD
1	PMC1: The project manager has knowledge regarding the project and project management.	1	2	3	4	5
2	PMC2: The project manager has experience of prior projects.	1	2	3	4	5
3	PMC3: The project manager knows the application of tools and techniques in performing project activities.	1	2	3	4	5
4	PMC4: The project manager has interpersonal skills and the ability to resolve conflicts.	1	2	3	4	5
5	PMC5: The project manager has received training on projects.	1	2	3	4	5

Sr. No.	Question	SA	A	N	D	SD
6	PMC6: The project manager is aware of project management methodologies.	1	2	3	4	5
7	PMC7: The project manager has leadership abilities.	1	2	3	4	5
8	PMC8: The project manager has team-building and decision-making skills.	1	2	3	4	5

Employee Agility Scale

Sr. No.	Question	SA	A	N	D	SD
1	EA1: I am comfortable with change, new ideas, and new technologies in my organization.	1	2	3	4	5
2	EA2: I am flexible to quickly change from task to task, job to job, and place to place.	1	2	3	4	5
3	EA3: I map my skills, benchmark for skill assessment, and develop skills.	1	2	3	4	5
4	EA4: I am comfortable with cross-functional project teams, collaborative ventures with other companies, or with a virtual organization.	1	2	3	4	5

Sr. No.	Question	SA	A	N	D	SD
5	EA5: I am tech-savvy and have knowledge in advanced manufacturing technologies, IT skills, use of mobile technologies, etc.	1	2	3	4	5
6	EA6: I quickly develop skills, adjust to new environments, and collect information.	1	2	3	4	5
7	EA7: I take personal interest in collecting information about my organization and other related organizations.	1	2	3	4	5

Project Success Scale

Sr. No.	Question	SA	A	N	D	SD
1	PS1: The project is completed within the planned time schedule.	1	2	3	4	5
2	PS2: The project is completed within the approved budget.	1	2	3	4	5
3	PS3: The project achieves the expected quality and technical standards.	1	2	3	4	5
4	PS4: The project meets the objectives that were set at the beginning.	1	2	3	4	5
5	PS5: The project deliverables match the agreed scope and specifications.	1	2	3	4	5

Sr. No.	Question	SA	A	N	D	SD
6	PS6: Project risks and agreed scope changes are managed effectively.	1	2	3	4	5
7	PS7: The project complies with defined procedures, safety requirements, and environmental regulations.	1	2	3	4	5
8	PS8: Project documentation and reporting are complete and properly maintained.	1	2	3	4	5
9	PS9: The project has a positive profile and reputation among stakeholders.	1	2	3	4	5
10	PS10: Key stakeholders are satisfied with the project process and outcomes.	1	2	3	4	5
11	PS11: Beneficiaries or the general public are satisfied with the project results.	1	2	3	4	5
12	PS12: The project creates visible positive impact for beneficiaries or users.	1	2	3	4	5
13	PS13: The benefits of the project are sustainable after project completion.	1	2	3	4	5
14	PS14: The project contributes to organizational, community, or public-sector development goals.	1	2	3	4	5

Sr. No.	Question	SA	A	N	D	SD
15	PS15: Overall, this project can be considered successful.	1	2	3	4	5

Variable Scoring Method

Variable	Scoring Method
Agile Leadership (AL)	Calculate the mean of AL1 to AL32. Higher scores show stronger perceived agile leadership.
AI Adoption (AIA)	Calculate the mean of AIA1 to AIA5. Higher scores show higher perceived AI adoption.
Project Manager Competency (PMC)	Calculate the mean of PMC1 to PMC8. Higher scores show stronger project manager competency.
Employee Agility (EA)	Calculate the mean of EA1 to EA7. Higher scores show stronger employee agility.
Project Success (PS)	Calculate the mean of PS1 to PS15. Higher scores show higher project success.

Items and Statements

Item	Statement
AL1	AL1: My leader has a strategic vision to achieve the goals of our organization.
AL2	AL2: My leader creates a suitable working environment for employees to develop creativity and discovery-oriented behavior.
AL3	AL3: My leader assigns the right person to the right job at the right time.
AL4	AL4: My leader gives importance to short-term goals to increase organizational performance.

Item	Statement
AL5	AL5: The incentives and bonuses given by my leader positively affect employee behavior.
AL6	AL6: My leader ensures that employees understand why they are doing their assigned work.
AL7	AL7: My leader guides subordinates through actions rather than only words.
AL8	AL8: My leader rewards innovative ideas and practices.
AL9	AL9: My leader motivates subordinates to perform better.
AL10	AL10: My leader provides a high-quality work environment, social support, and job security to subordinates.
AL11	AL11: My leader ensures and develops cooperation among departments in the organization.
AL12	AL12: My leader includes subordinates in decision-making processes from the beginning to the delivery of a product or service.
AL13	AL13: My leader rewards team performance rather than only individual performance.
AL14	AL14: My leader gives importance to teamwork rather than individuality.
AL15	AL15: My leader develops subordinates through an effective feedback culture.
AL16	AL16: My leader allows employees at any level to demonstrate leadership on an issue.
AL17	AL17: My leader has a strong ability to persuade subordinates.
AL18	AL18: My leader has sufficient up-to-date technological knowledge to follow market trends.
AL19	AL19: My leader reaches subordinates quickly by using social media and new technology-based communication channels.
AL20	AL20: My leader prepares the organization in advance for environmental and technological changes.

Item	Statement
AL21	AL21: My leader delegates authority to field experts to enable quick decision-making.
AL22	AL22: My leader makes flexible plans to produce different products, services, or project outputs.
AL23	AL23: My leader supports flexibility in producing different amounts of products or services according to technological and environmental changes.
AL24	AL24: My leader supports flexible personnel exchange between departments or teams under human resource policies.
AL25	AL25: My leader allows subordinates to be flexible about their working hours when needed.
AL26	AL26: My leader does not insist that subordinates do work they do not believe in.
AL27	AL27: My leader gives importance to delivering products or services to customers as soon as possible.
AL28	AL28: Decision-making speed in the work or production process is high under my leader.
AL29	AL29: My leader acts quickly to produce outputs that are demanded by the market and to bring them to the market.
AL30	AL30: My leader senses environmental and technological changes.
AL31	AL31: My leader has the knowledge, skills, and ability to adapt new technological products or services to the organization.
AL32	AL32: My leader strives to respond to changes in customer expectations and demands as soon as possible.
AIA1	AIA1: Our organization deploys advanced technologies, such as artificial intelligence, in its operations.
AIA2	AIA2: Our organization adopts artificial intelligence for making the right strategic decisions.
AIA3	AIA3: Our organization uses artificial intelligence to design products, services, or project solutions.

Item	Statement
AIA4	AIA4: Our organization has a continuous process for adopting next-generation technologies to achieve competitive performance.
AIA5	AIA5: Our organization readily accepts proven technological tools, such as artificial intelligence, for further innovation.
PMC1	PMC1: The project manager has knowledge regarding the project and project management.
PMC2	PMC2: The project manager has experience of prior projects.
PMC3	PMC3: The project manager knows the application of tools and techniques in performing project activities.
PMC4	PMC4: The project manager has interpersonal skills and the ability to resolve conflicts.
PMC5	PMC5: The project manager has received training on projects.
PMC6	PMC6: The project manager is aware of project management methodologies.
PMC7	PMC7: The project manager has leadership abilities.
PMC8	PMC8: The project manager has team-building and decision-making skills.
EA1	EA1: I am comfortable with change, new ideas, and new technologies in my organization.
EA2	EA2: I am flexible to quickly change from task to task, job to job, and place to place
EA3	EA3: I map my skills, benchmark for skill assessment, and develop skills.
EA4	EA4: I am comfortable with cross-functional project teams, collaborative ventures with other companies, or with a virtual organization.
EA5	EA5: I am tech-savvy and have knowledge in advanced manufacturing technologies, IT skills, use of mobile technologies, etc.
EA6	EA6: I quickly develop skills, adjust to new environments, and collect information.

Item	Statement
EA7	EA7: I take personal interest in collecting information about my organization and other related organizations.
PS1	PS1: The project is completed within the planned time schedule.
PS2	PS2: The project is completed within the approved budget.
PS3	PS3: The project achieves the expected quality and technical standards.
PS4	PS4: The project meets the objectives that were set at the beginning.
PS5	PS5: The project deliverables match the agreed scope and specifications.
PS6	PS6: Project risks and agreed scope changes are managed effectively.
PS7	PS7: The project complies with defined procedures, safety requirements, and environmental regulations.
PS8	PS8: Project documentation and reporting are complete and properly maintained.
PS9	PS9: The project has a positive profile and reputation among stakeholders.
PS10	PS10: Key stakeholders are satisfied with the project process and outcomes.
PS11	PS11: Beneficiaries or the general public are satisfied with the project results.
PS12	PS12: The project creates visible positive impact for beneficiaries or users.
PS13	PS13: The benefits of the project are sustainable after project completion.
PS14	PS14: The project contributes to organizational, community, or public-sector development goals.
PS15	PS15: Overall, this project can be considered successful.