

Linking Team Communication to Agile Software
Development Project Success: Mediating Role of
Team Adaptability and Moderating Effect of
Shared Goals



MS Thesis

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I Hadia Ahsan, CIIT/SP23-RPM-006/LHR, hereby declare that I have produced the work presented in this thesis, during the scheduled period of study. I also declare that I have not taken any material from any source except referred to wherever due to that amount of plagiarism is within an acceptable range. If a violation of HEC rules on research has occurred in this thesis, I shall be liable to punishable action under the plagiarism rules of HEC.

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Dedication

I dedicate this thesis to the **Almighty Allah**, who both created me and gave me the willpower and inspiration to finish it. In addition, I thank the **Prophet Muhammad (PBUH)** for his wisdom. I also dedicate this thesis to my **mother, Ms. Nasreen Ahsan**, whose unconditional love, encouragement, prayers, and emotional support have been a constant source of motivation throughout my academic journey. I am sincerely thankful to my **father, Mr. Ahsan Qayyum**, for his guidance, sacrifices, and continuous encouragement. I further dedicate this work to my **husband, Mr. Abdullah Bilal**, for his patience, understanding, and unwavering support during the completion of this research. Furthermore, I extend my sincere appreciation to my **supervisor, Dr. Imran Shafique**, for his continuous guidance, valuable advice, and unwavering support throughout this research.

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Hadia Ahsan

Abstract

Linking Team Communication to Agile Software Development Project Success: Mediating Role of Team Adaptability and Moderating Effect of Shared Goals

By

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In order to accomplish the requirements of Agile software development, an environment characterized as being very flexible is required to be able to collaborate with team members effectively and to align the needs of all team members with the goals of the project. Although Agile methodologies have been adopted by many companies globally, there is little evidence of studies that investigate the impact of individual factors at the level of a team on the outcomes of an Agile project; especially within countries in the developing world. This study utilizes the Input–Process–Output (IPO) model to assess the relationship between the communication of a team and the success of the projects of an Agile software development process, in addition to assessing the mediating role of team adaptability and the moderating effects of shared goals.

A Quantitative Research Design was used to collect the data from Professionals in Pakistan who work on Agile Software Development Teams, such as Project Managers, Scrum Masters, and Software Developers. Data collection occurred via a Structured Questionnaire. A PLS-SEM (Partial Least Squares Structural Equation Model) was performed via the SmartPLS program to evaluate the direct, mediating and moderating relationships of the study variables.

Results indicate that team communication among team members positively affects the success of Agile Software Development Projects. Results also indicate that Team Adaptability partially mediated the relationship between Team Communication and Agile Software Development Project Success. Therefore, team communication will increase Agile Software Development Project Success through enabling teams to adapt to the changes in project requirements. Also results indicate that Shared Goals

significantly moderated the relationship between Team Communication and Agile Software Development Project Success. Thus, Higher Goal Alignment will strengthen Team Effectiveness and therefore produce better Agile Project Outcomes. Therefore, this study extends the use of the IPO model in Agile Project Management Literature through the inclusion of Communication, Adaptability, and Shared Goals. Additionally, the findings of this study offer valuable information to Project Managers and Organizations on the best ways to implement communication practices, encourage team adaptability, and establish shared goals to improve the success of Agile Software Development Projects.

Keywords: Team Communication; Team Adaptability; Shared Goals; Agile Software Development Project Success; IPO Model; PLS-SEM.

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List of Abbreviations

ASDPS Agile Software Development Project Success

Chapter 1: Introduction

1.1 Background of the Study

In February 2001, a meeting was organized in which 17 leading software process methodologists came together to discover the more successful methods of making software (Chow & Cao, 2008). The working of the research participants resulted in the manifesto of agile practice to develop software that discusses how the traditional technique of project management is rigid and how it affects the outcomes of the software development project (Lechler & Yang, 2017). The agile values are primarily concerning the individuals and their relationships, the working software, the Collaboration with the customer and the Adaptation to the change (Campanelli & Parreiras, 2015).

The (Alliance, 2001) also proposed 12 agility-related principles, such as “Valuable software delivery in a frequently and continuous fashion, Requirements change is welcome, deliver software frequently, Constant interaction between business people and developers, Motivated people, face to face communication, working simplicity, Self-organizing teams, and Improve continuously” (Tam et al., 2020). Shared goals are the common aspirations of people that convey a sense of common fate (Adler & Kwon, 2002). Shared Goals work as a common factor. It allows people to coordinate their work and behaviors successfully for the benefit of each other (Chow & Chan, 2008). They do not only represent identified and documented purposes. Goals in common demonstrate that individuals feel that the community or society concurs with their personal interests, and that the group would contribute to their personal interests both in the present and in the future (Claridge, 2020).

Shared goals are effective when individuals anticipate each other to assist them, fulfill their commitments, and live up to their expectations, and also develop a feeling of belonging, togetherness, and trust (Lesser & Prusak, 2013). They act as an ingredient of cohesion where actors are able to meet their efforts and act together to their benefit (Chow & Chan, 2008). Performing under strong shared goals helps the actors to prioritize the group goals over the individual and this enhances the teamwork, collaboration, and coordination, which benefit not one individual, but the entire group

(Uhlener et al., 2015). The accuracy and unambiguity of the information transfer in the team dynamics has been comprehensively explored in terms of team communication (Salas & Cannon-Bowers, 1997). The role that client interaction plays in an external team process is a topic that has recently reached an increased level of attention in the research discourse (Mohe & Seidl, 2011). Adaptability of the team is the capacity of a team to alter their way of doing things when they develop a new demand. (Chan, 2000). It implies that it is necessary that the teams continue to transform their processes to handle environmental changes, make significant modifications to handle new problems and situations as well as modify their strategies initiatives and key objectives to handle unexpected and changing situations (Burke et al., 2006).

Agility refers to the ability of a team to adapt, and is commonly researched at the organizational level. Agility is the ability of a company to rapidly adapt to any changing circumstance (McCann et al., 2009). The agility term is concerned with how organizations adjust to suit with new outside situations, and the concept of team adaptability is concerned with how a team adjusts the job they perform to suit a specific client need.

1.2 Problem Statement

This is because ASDPS heavily depends on cross-functional teams where individuals with diverse expertise in different fields work together to ensure similar objectives are realized (Uhl-Bien & Graen, 1998). Team communication is necessary to make these teams successful (Aldahmash et al., 2017).

The teams of management consultants often require discussing the problem with the client in order to fully understand the problem, meaning that team communication with the client forms a valuable component of problem solving (Kakabadse et al., 2006).

Unlike the past studies which have emphasized on showcasing communication within the team as a teamwork skill (Salas et al., 2000), we identify external client communication as a process which is similar to a taxonomy of team processes (Marks et al., 2001). Constant contact with clients helps the consulting teams to acquire even more information about the projects and the unique needs of their clients, which

positively impacts their expertise in and awareness of the task at hand (Klarner et al., 2013).

Although the success of agile software development projects has been found to enhance such practices as customer collaboration, quick delivery of operational software, and flexibility of teams, there are still challenges (Aldahmash et al., 2017). (Wallace et al., 2004) point out that customers must never be excluded in the project since their absence may lead to a large increase in project risk and eventual failure. The concept of the direct communication of the Agile methodology and significant engagement of the customers, implies that there should be good, healthy relationship between the client and project team members. This connection can demonstrate the success or failure of the project and will probably influence the success or failure of the agile method (Tam et al., 2020).

The other aspect that can impact the correlation relationship between success and communication is whether there are common goals or not. The common aims may lead to unifying the team, foster trust, and make them feel a part of it, whereas the lack of goals can divide it and make it less worthy (Claridge, 2020).

Individual needs, particularly those that contradict those of the team, make it more difficult to achieve when team members prioritize their needs over the team, as well as challenging in getting the team members to cooperate with one another, trust each other, and feel that they are a part of the team. It causes the group to become less effective and, therefore, less engaged and more isolated and disconnected (Claridge, 2020). In the absence of shared goals, it is natural that team members will operate independently and engage in activities that are beneficial to them (Putnam, 2000). This disintegration makes the achievement of an individual and collective aspirations more difficult. The false or unreachable purpose and aim can undermine a common spirit, cohesion, and trust (Claridge, 2020). In Agile software development, cross-functional teams might not be adaptive and communicative due to lack of similar goals, which might seem to compromise the overall success of the project.

Despite the knowledge about such factors, no profound studies can justify the interaction of team communication, team adaptability, and shared goals to make an ASDPS. In most of the studies conducted on these elements, the elements and their

interdependencies are usually analyzed individually without considering their intricate connections. Organizations should be aware of these relationships to enhance the outcomes of their projects with the intention of having their Agile teams perform better.

Another aspect that is increasingly gaining significance is team adaptability. It implies that the team will switch its priorities, expectations and demands (McCann et al., 2009). Past researches have covered issues of team responses to unforeseen changes in the environment, highlighting how the team responded to situations where they had limited knowledge or training (LePine, 2005). However, insufficient attention has been given to how teams can be adjusted to a certain task especially when such tasks involve solving problems on behalf of external customers in the framework of the client organization (Werr & Styhre, 2002). These dynamics should be taken into consideration since project teams, similar to management consulting teams, are typically assembled as a resolution to problems that are specific to a client. It has to be adaptive due to the fact that customers often have unique wants and expectations (Appelbaum & Steed, 2005). Moreover, the evaluation undertaken in the process of these projects can identify particular priorities that require alterations in the project objectives and the project plan (Visser, 2006).

1.3 Research Questions

Based on the variables, here is the potential research question.

- What is the relationship between team communication, team adaptability and shared goals in influencing the ASDPS?

1.4 Research Objectives

The research objectives of this study is to:

1. To examine the relationship between team communication and ASDPS.
2. To analyze the mediating effect of team adaptability between team communication and ASDPS.
3. To investigate the moderating role of shared goals on the relationship between team communication and ASDPS.

1.5 Significance of the Study

The study aims at studying the relationship between team communication, team adaptability and shared goals with team adaptability being the mediating variable and shared goals being the moderating variable. This paper will provide some insight into how team communication on cross-functional teams, as well as team shared goals, can enhance team adaptability and lead to success of Agile software development project.

This study offers significant insights into Agile team dynamic by considering the fact that team adaptability mediates the connection between communication and success. As can be seen, flexibility is imperative to project teams that deal with clients; this is the requirement of those teams, which need to adapt to meet different goals, objectives and roles of various stakeholders so that they do not fail to meet the expectations of their clients (Appelbaum & Steed, 2005). This is directly connected to the essence of adaptability in the team according to Agile projects where teamwork among stakeholders is one of the most important concepts (Klarner et al., 2013). As observed, teams are often required to alter the unplanned shift in focus, resources, and goals, as new priorities are discovered or due to unexpected situations as the execution of the project continues (Klarner et al., 2013). Understanding of these dynamics improves both the scholarly discussion and the knowledge base of working in a shifting project environment, where flexibility is the key to success (Klarner et al., 2013).

The social competence of negotiating and demonstrating behavioral competence reinforces the flexibility of the team towards better relations with clients, establishment of trust and efficient sharing of essential information (Morgeson et al., 2005). This underlines the significance of the human part of adaptability and this makes the research particularly applicable towards the understanding the correlation between the ideas of communication, trust, and team adaptability (Klarner et al., 2013).

The richness of face-to-face interaction with the customer, in turn, can enable the team to better comprehend the issue and the context behind it, enabling it to further analyze the problem based on the insights that the client can form, and build final solutions which will satisfy the expectations of the client (Haas & Hansen, 2007) converse the project progress and possible solutions with the client on a regular basis, and create

final solutions that will satisfy the client. This might eventually make the client more satisfied with the output of the team (Klarner et al., 2013).

Regarding practical contribution, the study highlights how shared goals are an important moderating factor around how successfully Agile software development projects are. The goals have a tendency of shaping social norms in that they do not encourage negative activities but rather positive activities (Preece, 2004). They support collaboration, restrain egoistic behavior and encourage individuals to collaborate towards shared objectives (Putnam, 2000). Moreover, shared goals make work more meaningful, which makes it easier to evaluate individual and collective efforts, encourages the implementation of certain adaptations, and a powerful motivator to collaborate with others (Claridge, 2020). Setting goals that are achievable encourages cohesion, respect towards others, and trust within a limited duration of time (Claridge, 2020). The awareness of the achievements of the shared purposes and the admiration of their achievements makes them more influential and promotes a deeper cohesion of individuals (Claridge, 2020).

To make Agile software development projects success, the development of shared goals in cross-functional teams may facilitate the coordination of efforts, increase communication, and make teams more flexible with one another, which will eventually lead to successful projects.

The shared goals promote cooperation and trust that ensures a unity among the team members (Putnam, 2000). This study postulates that the capacity of teams to make changes is important in connecting team communication with success of agile projects, where shared goals moderate the connection.

This study is based on the Input-Process-Output (IPO) Model (McGrath, 1984) as its fundamental approach. The model of IPO is widely applied in the studies of team performance, which is instrumental when analyzing teams of any cross-functionality in agile conditions. The framework has it that the inputs of the team communication affect the team adaptability processes, which subsequently affect the agile software development project success outputs. Such things as common purpose can either reinforce or undermine such linkages by determining the work and flexibility (Burke et al., 2006).

This paper aims to provide an in-depth overview of the interaction of team communication, adaptability, and shared goals in supplying ASDPS through the prism of the IPO Model.

2.3.1 Team Communication

According to (Liu et al., 2020), team communication refers to the process of people working as a team. Teams can use sentiments and attitudes to express much of the whole information, which is indicated by words. It is important to adopt straightforward communication style that ensures everyone within the team knows the information needed to perform their duties correctly (Bourke et al., 2024). Moreover, an open and honest communication style is beneficial to enhance the relationship and trust of the team members ((Zawawi et al., 2023).

It is possible that team communication can be used to control the expectations of stakeholders and raise awareness within the organization about the changes and advantages of being agile (Johnson et al., 2023). Agile team communication is adaptable, fast to respond and proactive generating understandings and coordination within the organization. All these help in making the organization more agile in totality. Team communication is vital in this context that facilitates everyone's understanding, increasing the required development (Johnson et al., 2023). It ensures that the goal of

the project is made known to all members of the team and how their contribution can assist to achieve the project. This enhances team work, morale, output, overall performance and project success. Also, the technical interdependencies become easier to manage with the help of communication, which enables teams to collaborate on a task requiring the contribution of more than one expert and contributes to the overall efficiency of the project ((Bjarnason et al., 2022).

Moreover, team communication in the team plays a vital role in diverse processes and interrelated activities that culminate in outcomes like performance (Johnson et al., 2023; Marks et al., 2001). It is a known fact that team communication in a team leads to the amplification of team performance to a great extent by fostering vital processes such as coordination and formulation of strategies. To illustrate, it is primarily aimed at eliminating any misunderstanding of team members as well as acting as a channel through which significant data is communicated (Fletcher & Major, 2006).

2.3.2 Shared Goals

A shared goal is when there is a shared and clear meaning of a particular information, goals, procedures, or objectives among all members of the group, team, and or organization. This makes sure that all people have a common vision of ideas, goals and plans. Social interests unite a group of people and make them cooperate for their benefit (Chow & Chan, 2008).

Most communication is based on the Latin word, *communicare*, meaning to do something together, and it assists people in striving towards a shared goal. It is a process of passing the meaning between a person and other people or groups of people, with the help of both non-verbal and verbal options (Barrett, 2006).

Shared goals do not consist merely of set and written goals (Goswami & Agrawal, 2023). They share the common understanding that the interests of an individual are symbolized by his or her social group or the society. By developing the group, both at the current stage and in future, people can advance their interests (Claridge, 2020).

It is easy to think about what can happen when people act in their best interest, so it is easy to see how crucial shared goals can be. In a bid to pursue their personal agendas particularly when those agendas are in contrast to the group ones, this can lead to lack

of trust, unity and a feeling of belonging (Mazzucato, 2024). This disunity reduces effectiveness of the group and may lead to less involvement of the group members which may leave them feeling lonely and lack of association (Claridge, 2020).

2.3.3 Team Adaptability

According to (Maynard et al., 2015), the term team adaptability is characterized as the capacity to make the necessary changes within a team in relation to a disruption or trigger. The given ability is viewed as the significant component of team adaptability, which illustrates how the team responds to and changes itself in accordance with various factors (Maynard et al., 2015).

The theory of team adaptation concept views team adaptability as a set of interactions between teamwork and changing states, and each phase leads to the next step of an adaptive cycle (Burke et al., 2006). The emergent states are defined as constructions of qualities of the team that are typically dynamic and changing based on the context, inputs, processes and outcomes of the team (Marks et al., 2001).

Team adaptability is a concept of a team where the team is able to change its roles and structure upon the knowledge acquired in the course of interacting with one another throughout the implementation of the task and due to the conscious investigation of various options (LePine, 2005). This definition is aimed at underlining the importance of practical knowledge in the course of work and active exploration of different alternatives in order to enhance the effectiveness and flexibility of the team (Wang et al., 2024).

Agile practices focus on the concept of flexibility, which enables the companies to promptly adapt to changing market conditions and respond to the needs of customers (Fernandes et al., 2023). Unlike other project management strategies that follow the consecutive cycle, Agile enables teams to follow the continuous development model that empowers them to change according to knowledge or information (Celestin et al., 2024). In 2021, a survey of 500 companies revealed that 78 companies that used Agile methodologies reported greater adaptability to market changes and could better meet customer demands, and changes in the industry (Celestin et al., 2024). Such a flexible

capability also guarantees the ability of organizations to remain competitive in unstable business conditions (Celestin et al., 2024).

It has been demonstrated that team adaptation is a major requirement of high performance of groups that operate in highly dynamic environments and have to cope with creative tasks (Wu & Tham, 2023). Team adaptability is the definition of the capacity to change team performance processes according to environmental signals in a manner that helps to create functional team outcomes (Burke et al., 2006). The theory of team adaptation suggests that adaptive teams can (1) assess the situations effectively and work towards a cohesive comprehension of a new situation, (2) adjust their plans as needed, (3) design their work to fit the new situation, and (4) learn through the assessment of the efficacy. Also, a high score of flexibility is positively correlated with the capability of the team to backup (Marks et al., 2001), observe the team (McIntyre & Salas, 1995), and the high degree of congruence between the mental models (Salas et al., 2005).

2.3.4 Agile Software Development Project Success

The ASDPS has seen it becoming the method of handling complex projects in other sectors. It allows flexibility, responsive nature, as well as customer orientation therefore it is well suited to contemporary organizations operating within rapidly changing environments (Hooda et al., 2023). Agile approaches are based on iterative development, cross-functional collaboration and continuous feedback on the matter, which allows companies to adjust to uncertainties and evolving requirements of a project more effectively than traditional management approaches (Celestin et al., 2024).

The success of the Agile Software Development Project is a team effort between the development team, stakeholders and end-users who will act as one cross-functional and unified team (Mishra & Alzoubi, 2023). They have the perception of both needs and goals continuously during the development process. Agile has not only been a technique but is also rather a philosophy that teams have adopted in a bid to add value and minimize overhead costs of the project (Cohen et al., 2004).

The agile methodologies have helped many organizations to respond to the changing market conditions fast. They have been able to improve their work towards greater

client satisfaction and overall efficiency (Sarkar et al., 2024). Agile allows groups to be responsive to customer feedback and the changing requirements through its focus on continuous improvement and teamwork (Cohen et al., 2004).

In February 2001, a team of 17 industry leaders in the field of software process methodology came together to explore better methods of software development. Their cooperative activities resulted in the creation of the Agile Manifesto for software development which talked about the weaknesses of the conventional methodology of projects and the negative impact of the inflexibility on the final result of the software project (Tetteh, 2024).

According to (Campanelli & Parreiras, 2015), the manifesto combined the most important principles and values of the known Agile methodologies, adjusting them to the software development market. The main types to which the Agile principles are focused are the individuals and interactions, working software, collaboration with customers, and responding to the change (Campanelli & Parreiras, 2015). The importance of cooperation and flexibility is emphasized and this matter is crucial to the success of software development.

The most vital benefit of ASDPS lies in its capabilities of allowing the teams to adapt quickly and at all times focus on delivering the necessary product value. Teamwork is crucial in the process because people have to work effectively and understand their unique roles (Gheorghe et al., 2020).

Another important consideration is that the high standards to be maintained throughout the period of development should be maintained. On-going testing helps teams to identify and resolve problems as they arise. This constant testing allows the development team to have more time allocated to solve problems fast and the development cycle becomes smooth and efficient (Rolland et al., 2023).

The effective approaches of Agile software development projects can be based on knowledge intensive teams (Baham & Hirschheim, 2022; Chow & Cao, 2008; Tiwana, 2004). To be able to translate the problematic requirements into the software solutions, the team members should possess experience and ability to solve problems. The Agile teams are cross-functional and involve specialists in various fields working closely to

develop a comprehensive program to solve a problem of an economy or society (Guide, 2017). Also, agile teams seek to be empowered, independent, self-reflective, and adaptive (Stray et al., 2018). These team characteristics contrast with the team structures where coaches and leaders form their key power figures (Hoda et al., 2012).

2.4 Hypothesis development

2.4.1 Team Communication and Agile Software Development Project Success

Effective team communication is essential (Hoegl & Gemuenden, 2001). It can be stipulated in terms of the frequency, formalization, and transparency of the information shared. Frequency concerns the degree of interaction or the extent to which the team communicates with each other and how much time is used interacting (Hoegl & Gemuenden, 2001). The more the interaction takes place, the more effective the project (Hoegl & Gemuenden, 2001). Formalization revolves around the spontaneity of the interaction between members of the team (Lindsjørn et al., 2016). It is defined as unofficial communication like brief phone calls, informal communication, and brief e-mails. Formal communication, such as scheduled meetings needs to be highly prepared and planned (Lindsjørn et al., 2016). The only way of ensuring that successful cooperation takes place with agile software approaches is through informal talk. It makes communication, assessment, and discussion of ideas and contributions among the other team members effective and fast (Hoegl & Gemuenden, 2001). Team communication involves open information sharing between the members of the team (Lindsjørn et al., 2016). The office area is designed in such a way that teams are seated near each other to facilitate casual and free communication (Dingsøyr et al., 2016). Deficiency in open communication would hinder sharing of knowledge.

The agile team, project stakeholders, and customer's communication is a significant factor in the delivery process of software projects, which is a cycle of change and thus iterative (Mastrogiacomo et al., 2014). The customers are no longer setting the demands at the very beginning of the project implementation stage, achieving them in another stage of execution, and then delivering and closing the project. These stages form the implementation model of first-order conception about project management (Institute, 2000). These teams are now bound by the duty to interact with the project stakeholders

and customers throughout the project lifecycle since requirements and features are subject to change (Institute, 2000).

A case study research that was carried out at one of the most successful software organizations showed that software development teams worry about the provision of information necessary to complete their work successfully (Niinimäki et al., 2012). The information in interviews and received by secondary data through the selection of persons (50 countries and the total number of employees 50,000) indicated that duplication of information did exist. Project teams faced problems accessing necessary information, which they were unable to obtain (Niinimäki et al., 2012). Besides, workers felt anxious about being aware of who to turn to or where to be to achieve the expertise required to accomplish their task in the software development field (Israilidis & Jackson, 2012). This communication gap in a project can be reduced through proper utilization of emails, instant messaging, video conferencing, and audio conferencing. (Johnson et al., 2023)

H1. Team Communication is positively related to the ASDPS.

2.4.2 Team Adaptability as a connecting mechanism

The organization should be quick to embrace innovations and unforeseen changes within the environment in order to remain creative and achieve success in the present fast-paced environment (Diaz et al., 2023). Agile had been introduced in the IT industry as lightweight software development approaches due to requirement of more adaptability and it has been growing in popularity since ((Dybå & Dingsøyr, 2008).

Team adaptability (Chan, 2000) refers to the ability of a team to adapt to the new needs. This entails an ongoing enhancement of the team process to respond to changes in the environment making the necessary adjustments to respond to new issues and circumstances, shifting the focus, and adjusting the plans, activities, and priorities in reaction to conditions that are unpredictable and dynamic (Burke et al., 2006).

Adaptation works well whereby it minimizes performance decline at work due to a change in the environment and therefore helps in the overall system maintenance (Burke et al., 2006).

Adaptability has been discovered to be an important aspect of team performance in teams operating under highly dynamic environments or those with a creative task (Burke et al., 2006). The description of team adaptation proposed in the previous research studies was as follows: a shift in team performance due to a perception of a salient cue, or a stream of cues, that results in a functional outcome to the overall team (Burke et al., 2006). Such teams evade failure due to their ability to adapt to situations and develop a coherent perception about a new situation as suggested by the team adaptation theory (Rosen et al., 2011). Team adaptation has also been identified as a multi-faceted phenomenon, which includes various inputs, interaction processes and emergent states that lead to event-based changes in team properties and processes to facilitate higher level of effectiveness of teams operating in complex environments (Kim et al., 2024).

Team adaptability is related to the notion of agility that has been extensively studied on the organizational level (Burgelman, 1991). Agility refers to the ability of the business to change rapidly with emerging circumstances (McCann et al., 2009). Agility deals with the ability of business to adapt to changing circumstances, and team adaptability deals with the ability of a team to adjust what it does in order to satisfy the requirements of a customer. The two terms mean the ability to adapt to a trigger beyond the reach of the unit, e.g. environment or external client. Nevertheless, the analysis level is different. The concept of agility also implies that the environment evolves faster (McCann et al., 2009), although team adaptation may occur during the duration of a longer work. Besides the fact that the adaptable activities may occur at varying times, consulting teams may be regarded as a team-level agility.

H2. Team Adaptability is positively related to ASDPS

Finally, the ability to communicate with the client can make the team more flexible. It is with a project team that frequently informs the client about its progress that it has the best opportunity to learn with the client about the problem, be aware of varying client requests as it embarks on the solution and collaborate with the client to identify and negotiate the potential solutions (Haas & Hansen, 2007). This knowledge can support the team in knowing more about the issue at the beginning of the project, adjust to emerging expectations of customers during the projects development, and generate a more customized solution in the process. Lastly, it can make the recommendations

provided to the customer and the project worthy of achieving its objectives (Haas & Hansen, 2007).

H3. Team Adaptability mediates the relationship between Team Communication and ASDPS.

2.4.3 The moderating role of Shared Goals

Shared goals are objectives that a team or organization agrees on and works toward together. These goals establish a shared direction, creating an impression of purpose and inspiring each team member to strive toward a common goal. Shared goals are particularly essential since they assist to align individual efforts with organizational goals. When team members grasp the purpose of what they do, it is simpler for them to see how their contributions fit into the overall picture. Shared goals improves decision-making and efficiency. Shared goals clarify priorities, allowing teams to make faster, more coordinated decisions. It increases motivation and accountability. Clear, well-defined goals increase engagement because team members have a greater sense of responsibility and are driven by shared success (Pham, 2024).

A team that works toward common goals speaks more openly and clearly. Shared goals create context for interactions, ensuring that everyone understands the aims, priorities, and difficulties (Pham, 2024).

This approach avoids misunderstandings and encourages team members to communicate proactively, share updates, and give honest input, all of which lead to better cooperation and a more unified work environment (Pham, 2024).

The value of shared goals is acknowledged in the existing literature on work teams. The presence of clear shared goals enhances team performance (Aube & Rousseau, 2005), cohesiveness (Man & Lam, 2003), motivation (Kirkman & Rosen, 1999), and collaboration (Molm, 1994). Shared goals enable Scrum teams to align on essential business objectives, both inside the team and throughout the organization (Kristinsdottir et al., 2016). Several studies have pointed out goal congruence as a significant enhancer of Agile project performance.

Team goals help groups stay focused (Johnson & Johnson, 1991), build team cohesion (Johnson & Johnson, 1991; Widmeyer & Ducharme, 1997), and improve team performance. To create commitment to group Goals (Johnson & Johnson, 1991) proposed two options: (1) goals must be explicit, trackable and quantifiable, feasible and demanding, meaningful to the members, and transferable to other contexts, or (2) goals must be developed collaboratively by the group. Furthermore, the desirability of a goal and the relationship of the team influence commitment (Johnson & Johnson, 1991).

H4. Shared Goals Moderates the relationship between team communication and the ASDPS. The relationship is stronger when shared goals are clearly defined and understood by all team members.

Chapter 3: Research Methodology

3.1 Population

According to (Thacker, 2020), a population refers to the total number of people, events or objects that a researcher wishes to study. In this study, the relationship between team communication and the success of an agile software development project is investigated with the help of team adaptability as a mediator and shared goals as a moderator.

The broad population of this study is all individuals who are working in the ASDPS groups within the software development companies. These are some team leaders, software engineers, Scrum Masters and Agile coaches, as well as project managers, who are all involved in the agile software projects (Kadenic et al., 2023).

The target population is a specific group, often an individual who work in technology and IT firms on a software development team founded on agile development. These people are directly linked with communication, adaptability, and alignment in software development projects and would have been the best people to study. The study will focus on people within these organizations that are playing an active part in ensuring the success of agile software development projects. This will ensure that the study is focused on those individuals who directly interact with variables under study.

3.2 Sample and Sampling Technique

A section of a greater population or group is known as a sample. However, population does not necessarily mean the number of people. It could also denote the total amount of items or circumstances, which are being studied (Etikan et al., 2016).

The sample of this research includes employees who are involved in the ASDPS teams which include team leaders, software developers, Scrum Masters, Agile coaches and project managers. The choice of these people is influenced by their proactive participation in the communication of teams, flexibility, and shared goals, which make them the most relevant individuals to address the issues that influence the success of the agile software development projects (Hossan et al., 2023).

This paper uses purposive sampling as its sampling methodology (Obilor, 2023). This strategy will allow researcher to select individuals with some knowledge regarding how to communicate to a team, be flexible and make a project successful. The data should also be collected by people that are directly engaged in cross-functional agile software projects, as agile teams should collaborate closely and be able to be flexible most of the time.

3.3 Questionnaire Design

Following are the Tables of each variable with their items.

3.3.1 Team Communication

Thinking about the most recent project you were involved in, please recall the team you worked with and indicate your level of agreement with the following statements.

Table 1: Team Communication

Scale Item:	Statement:
<i>TC 01</i>	“In the project team, members communicated directly with one another.”
<i>TC 02</i>	“Project-related information was shared openly among all team members.”
<i>TC 03</i>	“The project team received information from other team members in a timely manner.”
<i>TC 04</i>	“The information communicated among project team members was accurate.”

Note: *TC= Team Communication*

3.3.2 Shared Goals

Thinking about the most recent project you worked on, please indicate your level of agreement with the following statements about the goals shared within your team and organization.

Table 2: Shared Goals

Scale Item:	Statement:
<i>SG 01</i>	“My organizational members and I always agree on what is important at work.”
<i>SG 02</i>	“My organizational members and I always share the same ambitions and vision at work.”
<i>SG 03</i>	“My organizational members and I are always enthusiastic about pursuing the collective goals and missions of the whole organization.”

Note: *SG= Shared Goals*

3.3.3 Team Adaptability

Based on your experience in the most recent project, please indicate your level of agreement with the following statements about how your team adapted to changes during the project

Table 3: Team Adaptability

Scale Item:	Statement:
<i>TA 01</i>	“We were able to identify specific areas that were affected by changes early on.”
<i>TA 02</i>	“We were able to develop change plans at an early stage in order to manage emerging changes.”
<i>TA 03</i>	“We were able to initiate arrangements for specific areas in order to manage changes with little effort at an early stage.”
<i>TA 04</i>	“If activities within the development process did not lead to the intended results, changes could be implemented soon and with little effort.”
<i>TA 05</i>	“We were able to react early and with little effort to changed conditions and unforeseen event.”

Note: *TA= Team Adaptability*

3.3.4 Agile Software Development Project Success:

Please indicate your level of agreement with the following statements regarding the outcomes of the project

Table 4: Agile Software Development Project Success

Scale Item:	Statement:
<i>ASD 01</i>	“The project was delivered within or under budget.
<i>ASD 02</i>	“The project was completed on time.”
<i>ASD 03</i>	“The final product’s performance met or exceeded the expectations of the end users.”

Note: *ASDPS= Agile Software Development Project Success*

3.4 Data Collection

An organized form of data collection will be employed to determine the impact of cross-functional teams on agile software development projects success. The independent variable will be team communication, the dependent variable will be ASDPS, team adaptability will be a mediating variable and shared goals will be the moderating variable. Data will be collected using a survey questionnaire through the use of items to measure each characteristic. The variables will be assessed using a Likert scale of five points, as recommended by (Revilla et al., 2014). It would make a finer distinction possible and could enhance the validity and consistency of the answers as compared to a five-point scale. Respondents will rate the items on the scale of 1 (Strongly Disagree) to 5(Strongly Agree).

Table 5: Measures

Variable of Study	No. of Items	Source
TC	4	(Al Shatti et al., 2018)
SG	3	(Chow & Chan, 2008)
TA	5	(Detzen et al., 2018)
ASDPS	3	(Tam et al., 2020)

Note: TC= Team Communication, SG= Shared Goals, TA= Team Adaptability, ASDPS= Agile Software Development Project Success

3.5 Data Analysis Techniques

The data collected for this study will be analyzed using the SPSS software. SPSS is statistical software used for statistical data analysis. Some of the main uses of SPSS software are statistical analysis, data manipulation, data visualization, big data processing, prediction and processing models, decisions and action taking, as well as research and publication (Nwogwugwu & Ovat, 2021).

This software is chosen due to its efficiency in handling large datasets and its comprehensive collection of statistical tools suitable for social sciences research. SPSS will be used to carry out the statistical analysis of the data, that began with data screening to check for missing values, followed by descriptive statistics in order to understand the demographic profile and the central tendencies of the variable. Descriptive statistics will be used to measure Mean, Variance, Standard deviation, and frequency.

The normality of the data will be measured through skewness and kurtosis to identify the type of data distribution. Reliability analysis using Cronbach's Alpha and Composite Reliability (CR) score will also be conducted to assess the internal consistency of each construct. Furthermore, we will also determine convergent validity by calculating the Average Variance Extracted (AVE) score. For discriminant validity analysis, Fornell and Larcker's criteria will be used.

This study is structured to examine the different sets of hypothesis, which includes the direct relationships between variables, the mediating effect and the moderating effect.

Chapter 4: Results and Discussion

4.1 Introduction

The fourth chapter will address examining and reporting the results from the survey. It has total 10 subsections. Section 1 is about the “introduction of the chapter”. The subsequent section, 4.2 explains “Data Management.” Section 4.3 is about Demographics. Further, section 4.4 explains the factor of “Data Normality.” Section 4.5 is about “Confirmatory Factor Analysis.” Section 4.6 refers to the ‘Reliability’ component of the data source. The seventh part, 4.7, explains the association between the items and the variables. The eighth section, 4. 8 is about the “Common Bias Method”. Section 4. 9 represents results of our hypotheses testing and section 4.10 contains summary of our results.

4.2 Data Management

Research data management is essentially a comprehensive process that encompasses all stages of data handling in research projects, from initial collection to ongoing monitoring (Ashiq et al., 2022). This process involves organizing, processing, storing, and protecting data to ensure the quality, integrity, and reliability of the data. (Munappy et al., 2022). Effective research data management requires careful planning from the start, consistent management throughout the project, and long-term strategies for storage and access (Ashiq et al., 2022). Quantitative data analysis is a systematic process for collecting and analyzing measurable data using statistical methods to assess and interpret numerical information (Kotronoulas et al., 2023). Quantitative research data can be collected in various formats, each offering valuable insights, common data collection methods in quantitative research are capturing visual and auditory information, gathering data through questionnaires and interviews, self-reports, observations and numerical findings in text documents and spreadsheets (Sadan, 2017). This survey is collected in cross sectional time horizon because data is collected at one point in time (Mehler et al., 2023). In this study, the survey questionnaire served as the primary instrument for data collection (Arundel, 2023).

4.2.1 Data Entry and Verification

After acquiring the data from software development organizations via Google Forms. We proceeded to input the data into SPSS and SMART-PLS software and assesses the suitability of each item (Sarkar et al., 2024). Although the data set was generally complete, a few of the responses were discarded due to incomplete and invalid data. After excluding those responses, the final dataset contained only fully usable entries. We performed the data encoding process which involves transforming the collected data into a numeric format. Similarly, the data entering process, which includes entering and organizing this data within a spreadsheet structure. Further, data conversion is performed to import and calculate specific data views, which allows for a meaningful interpretation of the collected data. The data that we entered in SPSS is presented accordingly. To ensure accuracy, we validate the data by cross-referencing participant's responses with the input data. Furthermore, we assess the values of our data by utilizing frequency table to examine whether the recorded values correspond and align appropriately with the predefined measurement scales. The assessment includes the 6 items for demographics, 4 items for team communication, 3 items for shared goals, 5 items for team adaptability, and 3 items for ASDPS.

4.2.2 Handling Missing Values

After we have performed the above mentioned process, and after successfully entering and verifying our data we moved towards performing the descriptive analysis in order to ensure whether there are any null values in our sample. Before conducting the descriptive analysis, the dataset was examined for missing values. Upon inspection, we found out that there were no missing values in our data, so no imputation techniques were required.

4.2.3 Descriptive Analysis

Statistical Analysis plays a crucial role in answering research questions by revealing relationships between variables and in hypotheses formulation (Schabenberger & Gotway, 2017). Descriptive analysis is a technique used to categorize and segregate the qualitative data from group samples, and it often utilizes two main types of data measurement: categorical and continuous (Nassaji, 2015). Categorical data can be classified into four types: binary, nominal, ordinal and ratio/interval. Binary data has two possible outcomes

only either correct or incorrect (dos Santos & Zárate, 2015). Nominal data is organized without a hierarchical structure, ordinal data has a clear hierarchy and levels but it lacks a scale, whereas, ratio/interval data on the other hand, includes a scale in addition to hierarchy and levels (dos Santos & Zárate, 2015). Continuous data consists of values that can vary within a specific range. Skilled statisticians must be involved during the data collection phase to ensure that the methods used are effective and precise (Ng, 2015; Scharfe, 2016). Descriptive analysis involves basic statistical methods, including measures of central tendency like mean, and the measures of dispersion like standard deviation (Hariyani et al., 2023). Descriptive studies commonly employ the standard deviation and mean, which are measures of dispersion and central tendency, respectively (Arnold et al.). These analytical tools clarify the distribution and significance of collected data, offering researchers provide valuable insights into their datasets (Loeb et al., 2017). In essence, descriptive analysis serves as a foundational tool for comprehending data characteristics and helping researchers learn and explore in various fields of study.

4.3 Demographics

Demographics include the respondent's gender, age (in years), educational qualification in 3 categories; (Bachelor's-16year education, Master's-18year education, and PhD), years of experience in software development, experience working in the current team, and organization size. Our targeted population was the software development organizations across Pakistan. We gathered 197 responses from the targeted population, among them 2 were discarded due to incomplete an invalid response. The questionnaire consisted of 15 items that represented independent, dependent variables, mediator, and moderator. Before doing the analysis, the data were appropriately coded into SPSS. The demographics data were coded according to their respective groups/categories, whereas the items for the other section were assessed using a 5-point Likert scale (Hutchinson & Chyung, 2023). Each item was coded using the SPSS software. Demographics output is presented in the following data.

Table 6: Demographics

Demographic Information		
Demographics	Frequency	Percentage
Gender		
Male	116	58.9
Female	81	41.1
Age (years)		
20-30	134	68
31-41	46	23
42-52	13	7
53-63	4	2
Educational Qualification		
Bachelor's-16year	111	56.3
Master's-18year	76	38.6
PhD	10	5.1
Years of Experience in Software Development		
Less than 1 year	53	26.9
1-3 years	55	27.9
4-6 years	46	23.4
7-10 years	21	10.7
More than 10 years	22	11.1
Experience Working in Current Team		
Less than 1 year	69	35
1-3 years	80	40.6
4-6 years	25	12.7
7-10 years	14	7.1
More than 10 years	9	4.6
Organization Size		
Less than 50 employees	52	26.4
50-100 employees	52	26.4
101-500 employees	45	22.8
501-1000 employees	20	10.2
More than 1000 employees	28	14.2

4.4 Data Normality

The normality test is a test carried out to check whether our research data comes from a population with a normal distribution. This test needs to be carried out because all parametric statistical calculations assume the normality of distribution (Fiandini et al., 2024).

Skewness and kurtosis are statistical terms that, along with mean and standard deviation, help describe the overall shape of the probability distribution of a variable. Skewness is the third standardized moment of the probability distribution and it measures the lopsidedness or asymmetry of the distribution (Hester & Hehman, 2025).

The kurtosis is the fourth standardized moment of the probability distribution and represents how fat or thin the tail of the distribution is. When assessing whether a given distribution is normal, one has to evaluate its two components; Kurtosis - how fat the distribution is, and Skewness - how symmetrically shaped the distribution is (Matore & Khairani, 2020). These are used to test the hypothesis that the probability that random samples of data will come from a normally distributed population. Statistical assumptions, including those related to normality of the data and other similar issues, need to be evaluated and controlled with great care since incorrect assessments of these assumptions could result in incorrect conclusions (Knief & Forstmeier, 2021).

Skewness and Kurtosis were examined as part of evaluating normality of the distribution of data collected. While many researchers suggest different thresholds for skewness and kurtosis, (George & Mallery, 2018) stated that skewness and kurtosis values are acceptable when they are below ± 2 , (Patel et al., 2015), (Hair et al., 2017), (Byrne, 2013) also suggest that the data is considered to be normal when the skewness values are in the range of -2 to +2, while kurtosis values are in the range of -7 to +7. Normal data typically exists within the range of -3 to +3 on the kurtosis scale. The skewness and kurtosis values must be within the ranges of -2 to +2 and -3 to +3, respectively to meet the requirements for normality.

Table 7: Skewness and Kurtosis

		TC	SG	TA	ASDPS
N	Valid	197	197	197	197
	Missing	0	0	0	0
Mean		3.7487	3.5838	3.6051	3.7766
Std. Deviation		.85435	.85011	.68226	.91273
Skewness		-1.012	-.643	-.899	-.873
Std. Error of Skewness		.173	.173	.173	.173
Kurtosis		1.141	.538	1.785	.625
Std. Error of Kurtosis		.345	.345	.345	.345

N=162, Acceptable Skewness -2 to +2, Kurtosis -3 to +3

The above table shows that each variable is normally distributed and is according to the skewness, kurtosis threshold values mentioned above. The values of both skewness and kurtosis fall in the acceptable ranges respectively, confirming that our data is normally distributed.

4.5 Confirmatory Factor Analysis

Confirmatory Factor Analysis (CFA), is a statistical method for validating the measurement constructs by assessing the relationship between the data collected from observed items and the actual constructs that they intend to measure (Huang, 2017). CFA has been used in our study as part of the evaluation of the measurement model. The use of CFA to test a measurement model is essentially a two-stage process, with both stages described by several other researchers (Bandalos & Finney, 2018). These include evaluating the measurement model in terms of the models' indices, ensuring that the model represents the theoretical constructs being assessed (Nye, 2023); as well as, establishing discriminant validity and convergent validity (Cheung et al., 2024).

To complete the confirmatory factor analysis, we utilized the PLS-SEM using SMART-PLS software to conduct and analyze the CFA. In the CFA, three of the fifteen items were removed from the analysis because they had low factor loading (less than 0.5 threshold). Removing those items enhanced the overall validity of the measurement model. The measurement model contained twelve items after refinement; the factor

loading of each item was greater than 0.5, indicating an acceptable factor loading value. Each of the retained items helped create a good model fit. The CFA analysis provided insight to the underlying latent constructs of the research model and clarified the associations between the observed variables. A table below shows the interpretation of the model fit

Table 8: Model Fit

	Saturated model	Estimated model
SRMR	0.080	0.086
d_ ULS	0.501	0.574
d_ G	0.231	0.227
Chi-square	276.223	263.611
NFI	0.714	0.727

4.5.1 Construct Validity

To validate the results of this study, we will use any item that has a factor loading of .6 or above to determine whether a scale is valid. Construct validity is the process of determining if a group of items are measuring what it is supposed to measure. It is very important when you are using a new measurement tool and want to know if the measurements are reliable (Rocheft et al., 2018). One way to determine construct validity is through a method called convergent validity. Convergent validity measures how well items are related to each other because they are supposed to measure the same construct versus simply being related (Gonzalez et al., 2021). Each of your items should have a factor loading of at least .50 and be statistically significant to establish convergent validity (Wammerl et al., 2019). Average Variance Extracted (AVE) is calculated by taking the average of all of the squared standardized factor loadings and dividing them by the number of indicators in the model. A minimum of an AVE of .50 is usually accepted as a threshold to be adequate (Hair et al., 2025) and composite reliability (CR) should be .70 or greater (Shrestha, 2021).

Table 9: Convergent Validity

Construct variable	Indicators	Factor	AVE
		Loading	
TC	TC1	0.760	0.601
	TC2	0.733	
	TC3	0.788	
	TC4	0.818	
SG	SG1	0.798	0.637
	SG2	0.790	
	SG3	0.806	
TA	TA1	0.904	0.779
	TA2	0.861	
ASDPS	ASDPS1	0.845	0.726
	ASDPS2	0.872	
	ASDPS3	0.839	

Note: TC= Team Communication, SG= Shared Goals, TA= Team Adaptability, ASDPS= Agile Software Development Project Success

The retained items for this research all demonstrate higher factor loadings. A researcher has demonstrated that an item's loading is considered when it exceeds 0.7 as suggested by (Henseler et al., 2009). This research uses the items with loadings exceeding 0.7. The convergent validity of each item is confirmed in the AVE and CR columns. The AVE values exceed 0.5, and the CR values exceed 0.7 confirming that all items possess validity.

4.5.2 Discriminant Validity

To evaluate discriminant validity, researchers typically examine whether each construct of a certain variable is more strongly associated with its own underlying factor than with the other factors (Cheung et al., 2024). Researchers commonly use a two-step approach to evaluate discriminant validity, first they examine the factor loadings of each construct in comparison to those of other constructs to confirm their substantial loadings on their

respective factors (Franke & Sarstedt, 2019). Another way to show discriminant validity is by comparing the square root of AVE for each concept with their inter-construct correlations. If the square root of AVE is high compared to the correlation coefficients, it indicates that the constructs are significantly distinct from each other and there is discriminant validity present in the model (Roemer et al., 2021).

Although discriminant validity is commonly defined as “two distinct constructs” and measured by the correlation between the two constructs, there is no generally accepted level of “distinctiveness” regarding the level of cross-construct correlation that establishes discriminant validity. One commonly used criterion is correlation significantly less than 1.0. Yet, high correlations (e.g., 0.9) that are statistically significantly less than 1.0 are difficult to defend as indicating two distinct constructs (Cheung et al., 2024).

Table 10: Discriminant Validity

	ASDPS	SG	TA	TC
ASDPS	0.852			
SG	0.575	0.798		
TA	0.545	0.485	0.883	
TC	0.547	0.517	0.622	0.775

Note: Square root of AVE is shown as highlighted box in diagonal ; TC= Team Communication, SG= Shared Goals, TA= Team Adaptability, ASDPS= Agile Software Development Project Success

To confirm, discriminant validity, the diagonal values (represents the square roots of AVE), must be greater than the corresponding inter-construct correlations. As shown in the table above, each diagonal values exceeds the related correlation coefficients, indicating that discriminant validity is established.

4.6 Reliability

Reliability states to the degree of stability and firmness exhibited by a measurement device (Xu & Saleh, 2021). Additionally, (Bougie & Sekaran, 2019) stated that Cronbach's alpha is a measure of reliability that discloses the amount to which the items

in a collection are positively related with each other. Therefore, following the data collection process, and before conducting any analysis, we assessed the reliability of each variable. According to some researchers, if the values of alpha are 0.9 or higher, it indicates good quality (Malkewitz et al., 2023), if the readings are greater than or equal to 0.8 but less than 0.9, it indicates the positive outcome (Kennedy, 2022). Values more than or equal to 0.7, and less than 0.8, are only acceptable values (Šprajc et al., 2019). Values greater than or equal to 0.6, but less than 0.7 are considered dubious and questionable, values between 0.5 and 0.6 are considered unsatisfactory, and if the results are below 0.5, they are deemed unacceptable (Kennedy, 2022).

Reliability is the foundation of validity, it also ensures consistency whether the items in questionnaire consistently measure the same concept (Afshari et al., 2022). The quality of research study is evaluated by evaluating its reliability and validity. Hence, the investigation should demonstrate the trustworthiness of the constructs. Before examining the results, it is important to examine the constructs of the study to ensure their reliability. This validation step precedes hypotheses testing. The Cronbach alpha's value for the variables under investigations are presented below:

Table 11: Reliability

Variable	No. of items	Cronbach's Alpha	Composite Reliability (CR)
TC	4	0.780	0.858
SG	3	0.717	0.840
TA	5	0.718	0.876
ASDPS	3	0.812	0.888

Note: TC= Team Communication, SG= Shared Goals, TA= Team Adaptability, ASDPS= Agile Software Development Project Success

4.6.1 Model Plot

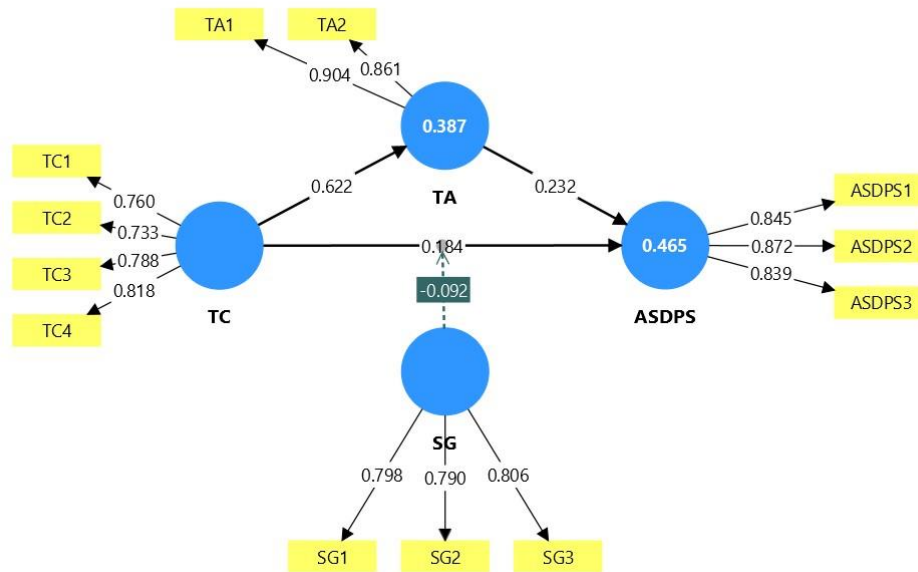


Figure 2: Model Plot

4.7 Collinearity Statistics

The first step in assessing collinearity in a multiple regression analysis is to check if there is evidence of collinearity; because evidence of collinearity can lead to biased estimates in a regression analysis. Assessing collinearity for multiple regression is similar to evaluating a formative measurement model, however, instead of examining the relationship between each predictor construct's latent variable scores and another latent variable score, researchers will use the latent variable scores of the predictor constructs to calculate VIF values. VIF values greater than five may suggest an issue with collinearity with respect to the predictor constructs used in the regression equation. Ideally, VIF values would be less than three (Cefis & Carpita, 2024).

In situations where researchers determine that there is evidence of problematic levels of collinearity, they have several options available to mitigate the effects of collinearity. One option is to develop a higher order model that is consistent with established theory (Cefis & Carpita, 2024).

To assess for CMB, researchers can utilize the comprehensive assessment for collinearity proposed by (Kock et al., 2021) via the use of Smart-PLS. The

comprehensive assessment utilizes variance inflation factor (VIF) values to examine the presence of both vertical and lateral collinearity by conducting a regression analysis where all latent constructs are regressed onto a common factor. According to (Kock et al., 2021), when VIF values are less than 3.3, the researcher can conclude that the model is free from common method bias. The results indicated that all VIF values ranged from 1.000 to 1.886, which is below the recommended threshold. Because the values represent the least amount of influence that any one factor has on the relationship(s) among the constructs and indicates that multicollinearity is at a minimum, these values support the conclusion that Common Method Bias is not a major concern for this study. The likelihood that method-related variance has distorted the study's findings is low.

Quantitative research methodology was employed to collect and analyze data. Data were collected via a survey instrument administered to professional staff members in Agile Software Development Teams within Pakistan who include project managers, Scrum Masters and software developers. Data collection utilized a structural questionnaire. A PLS SEM statistical technique was employed utilizing Smart-PLS as the software tool to statistically test the direct, mediating, and moderating relationships among the study variables (Sarstedt et al., 2023).

The results indicate that effective communication among team members positively affects the success of Agile Software Development Projects. Team Adaptability partially mediates the relationship between effective communication among team members and the success of Agile Software Development Projects. Thus, effective communication among team members enables teams to make adjustments to their processes, roles, and strategies in response to changes in the project requirements, thereby enhancing project success. Additionally, Shared Goals significantly moderates the relationship between effective communication among team members and project success. Hence, when teams share common goals, effective communication among team members is strengthened, resulting in enhanced team effectiveness and improved project outcomes.

This study adds to the literature in the field of Agile Project Management by expanding the application of the IPO framework to the incorporation of Communication,

Adaptability and Shared Goals. The results of this study also suggest practical implications for Project Managers and Organizations to improve communication practices, develop team adaptability, and establish shared goals to enhance the Agile Software Development Project success.

Table 12: Collinearity Statistics

	ASDPS	SG	TA	TC
ASDPS				
SG	1.529			
TA	1.741			
TC	1.886		1.000	

TC= Team Communication, SG= Shared Goals, TA= Team Adaptability, ASDPS= Agile Software Development Project Success

4.8 Hypotheses Testing

Hypothesis testing in Smart-PLS is called as structural model. A structural model examines the significance and strength of the relationship between latent constructs. The use of the bootstrapping technique allows testing the robustness of the model that gives information on the indicators and variables. (Sharma et al., 2024). It is inappropriate to carry out a parametric significance test on the model. Therefore, to solve this problem the t-test is utilized. The t-test is carried out with the aid of the bootstrapping technique. An ideal t-test significant value has a minimum value greater than 1.65 (Meena et al., 2023).

With regard to the measurement model, proposing the next hypotheses.

(H1): Team Communication is positively related to the ASDPS.

(H2): Team Adaptability is positively related to the ASDPS.

(H3): Shared Goals is positively related to the ASDPS.

Before performing hypotheses testing, use the Smart-PLS bootstrap procedure to assess the whole structural equation model. The Smart-PLS bootstrapping method allows for

evaluation of the outer loadings and all of the T statistic and p values. The results of the hypothesis tests are presented in table 4.10. The critical value of p is $< .05$ at a 95 percent confidence level (Sharma et al., 2024).

4.8.1 Structural Model Assessment

The structural path is the last step in assessing the measurement model to analyze path coefficients along with their statistical validity. H1 tests whether team communication influences ASDPS positively and significantly. The outcomes showed that team communication has a statistically valid and positively significant impact on ASDPS ($t = 2.409$; $B = 0.184$; $p < .05$). Hence, H1 was supported. The results are present in Table 14.

H2 evaluates whether team adaptability significantly and positively affects ASDPS. The result discovered that team adaptability has a significant and positive impact on ASDPS ($B = 0.232$, $t = 2.853$, $p < 0.05$). Hence, H2 was supported. The results are present in Table 14.

H3 evaluates whether shared goals significantly and positively affects ASDPS. The result shown that shared goals has a significant and positive impact on ASDPS ($B = 0.309$, $t = 4.208$, $p < 0.05$). Hence, H3 was supported. The results are present in Table 14.

This study examined shared goals as a moderator to predict shared goals moderation mechanism team communication and ASDPS. The results in Table 4.11 exhibit that shared goals has negatively moderated the relationship between team communication and ASDPS ($\beta = -0.092$, $t = 2.499$, $P = 0.012$, $p < 0.05$).

Table 13: Direct and Moderating Effect

Hypothesis	Beta Coefficient	Standard deviation	T statistics	P values
H1: TC -> ASDPS	0.184	0.077	2.409	0.016
H2: TA -> ASDPS	0.232	0.081	2.853	0.004
H3: SG*TC -> ASDPS	-0.092	0.037	2.499	0.012

Note: TC: Team Communication, TA: Team Adaptability, SG: Share Goals, ASDPS: Agile Software Development Project Success.

4.8.2 Mediation Analysis

The study in addition, utilized the Bootstrapping method to assess indirect effect from Team Adaptability to the relationship of Team Communication and ASDPS (Adam, 2023). It was found in this research that the specific indirect effects of Team Adaptability on the positive and statistically significant relationship between Team Communication and ASDPS were found ($\beta=0.145$, $t=2.665$, $P = 0.008$, $p<0.05$).

Table 14: Indirect Effect

Hypothesis	Beta Coefficient	Standard deviation	T statistics	P values
H4: TC -> TA -> ASDPS	0.145	0.054	2.665	0.008

Note: TC: Team Communication, TA: Team Adaptability, ASDPS: Agile Software Development Project Success.

The results of the study reveal that there was a direct effect of Team Communication on ASDPS ($\beta = 0.184$, $P = 0.016$, $p < 0.05$), and an additional direct effect of Team Adaptability on ASDPS ($\beta = 0.232$, $P = 0.004$, $p < 0.05$); the latter was also found to

be significant and positive. (Iqbal et al., 2023) stated that when both direct and indirect effects occur as a result of a mediator, then partial mediation exists; whereas, when no direct effects exist but a positive and significant indirect effect occurs, then full mediation exists. Therefore, based upon the results of this study (Iqbal et al., 2023), it appears that partial mediation existed within the data collected for this study.

4.9 Summary of Hypotheses

Hypothesis results are summarized below:

Table 15: Hypotheses Testing

Hypotheses	Relationship	Results
H1	TC is positively related to ASDPS.	Supported
H2	TA is positively related to ASDPS.	Supported
H3	SG moderates the relationship between TC and ASDPS.	Not Supported
H4	TA mediates the relationship between TC and ASDPS.	Supported

Note: TC: Team Communication, TA: Team Adaptability, SG: Share Goals, ASDPS: Agile Software Development Project Success.

From the hypotheses results above, we concluded that team communication has a positive relationship with ASDPS, Team adaptability also has a positive relationship with ASDPS. The results also indicate that team adaptability mediates the relationship between Team communication and ASDPS. As we have taken shared goals as the moderator in this study, it also moderates the relationship between team communication and ASDPS. However, the results indicate that even if shared goals moderates the relationship between team communication and ASDPS, the relationship between team communication and ASDPS becomes weaker with higher shared goals.

One possible reason is that in teams with strong Shared Goals, members rely more on mutual understanding and assumptions rather than clear and frequent communication. Team members may assume that others already know what needs to be done, which

reduces personal responsibility and the need to communicate. Because of this, communication adds less value to project success.

This finding is especially important in agile software development projects, where work conditions change quickly and clear communication is necessary. When teams depend too much on Shared Goals, they may communicate less actively, which weakens the positive effect of Team Communication on ASDPS.

Chapter 5: Conclusion

5.1 Theoretical Implications

This research makes several important theoretical contributions by providing enhanced insights into how Team Communication, Team Adaptability, and Shared Goals individually and collectively impact ASDPS. Grounded in the Input-Process-Output (IPO) Model, the empirical findings provide additional evidence that the model remains applicable in the context of Agile software development environments, indicating that Team Communication is a necessary input influencing team adaptability, which in turn affects successful project outcomes.

The findings indicate that Team Communication has a direct and positive significant impact on ASDPS, providing support for prior literature indicating that the openness, timeliness, and accuracy of information sharing are foundational for successful Agile team performance. While prior literature also indicates the importance of communication for coordination, shared understanding, and problem solving in Agile teams, the current study provides further theoretical development by validating the relationships described above in the context of cross-functional software development teams in Pakistan, which represents an emergent context in which Agile transformation is rapidly expanding.

Another theoretical contribution is the establishment of Team Adaptability as a mediator in the relationship between Team Communication and ASDPS. Prior research has identified adaptability as an important characteristic of Agile teams; however, relatively little research has systematically examined its mediation role. This study demonstrates that communication alone is insufficient; rather, its positive effects are primarily converted into project success based on the improved capacity of the team to modify plans, respond to unanticipated events, and reconfigure task assignments. These findings strengthen the theoretical argument that adaptability is a dynamic capability that mediates the relationship between interpersonal behavior (i.e., communication) and performance outcomes.

Additionally, this study expands our theoretical understanding by examining the extent to which Shared Goals act as a contextual factor moderating the relationship between Team Communication and ASDPS. The findings suggest a negative moderation, such

that the positive effect of communication on project success diminishes somewhat when teams exhibit very high levels of shared goals. Importantly, this suggests: When teams exhibit very high levels of shared goals, there is likely reduced reliance on communication, since the clarity of direction limits the need for ongoing coordination.

When teams exhibit low levels of shared goals, it is likely that they will rely more on communication to foster alignment and cohesion among team members. These nuances represent a refinement to the theoretical underpinnings of Agile teamwork, as they demonstrate that the effectiveness of communication depends on the degree of alignment of the team's level of goals. As a whole, the study represents a more sophisticated understanding of how team processes and motivational factors interact to produce project outcomes in Agile environments.

Collectively, this research reinforces the theoretical view that successful Agile software development does not arise from individualistic practices, but from the interdependent processes of communication, adaptability, and common values and beliefs among team members acting within the context of the IPO framework.

5.2 Practical Implications

The results of this research provide actionable implications for Project Managers, Scrum Masters, Agile Coaches, Software Development Organizations and HR Practitioners.

Firstly, the statistically significant relationship between Team Communication and ASDPS indicates that organizations have a responsibility to ensure they have the necessary communication-enabling mechanisms available to their employees. The encouragement of the ongoing exchange of information through both formal (e.g., daily stand-up meetings, sprint reviews) and informal (e.g., casual conversation) communication methods will help foster a culture of open and transparent communication in the workplace. Managers can further support communication among team members by creating collaborative workspaces, fostering psychological safety, and ensuring that team members understand the importance of sharing information.

Secondly, because Team Adaptability acts as a mediator, organizations need to develop teams that can adapt quickly to changes in project requirements. To achieve this,

organizations can encourage ongoing training and practice in adaptive problem solving, provide opportunities for experimentation and feedback, allow for decentralized decision making, and enable flexible task roles for team members. When a team has high levels of adaptability, it is much easier for them to convert good communication into successful project outcomes; therefore, adaptability is a critical capability for organizations operating in environments such as R&D and software development that experience frequent changes in project requirements.

Thirdly, while Shared Goals was identified as an important moderator, it indicated that Shared Goals contribute positively to ASDPS. However, the moderating effects indicate that when there is already a high degree of shared goals among team members, too much communication may add to redundancy rather than added value. Therefore, organizations can use shared goals strategically by clearly defining the project goals during the sprint planning phase, developing a shared understanding of project priorities among all team members, developing a unified vision for cross-functional teams and aligning individual responsibilities to collective objectives. At the same time, organization leaders must realize that high levels of shared goals reduces reliance on communication, which allows teams to operate autonomously. Therefore, agile leaders must find the right balance between structured alignment and communication practices. Lastly, the insights provided by this study can be used by HR departments and management teams to design employee selection, training and performance evaluation processes that focus on developing strong communication skills, adaptive behavior and commitment to shared goals. These types of processes will likely lead to increased project success and greater organizational agility.

5.3 Limitations

This study provides some valuable theoretical and practical insights; however, there are several limitations of this study. First, since the sample was selected based upon purposive sampling, the findings may not reflect all professionals involved in agile software development projects in Pakistan, nor in other nations. Second, the data for the study were collected via an online survey that would exclude anyone who is inactive online or uncomfortable with technology; these groups may have different communication practices and/or work experiences than those responding. Third, no consideration was given to other organization factors (e.g., company culture, team size,

project complexity, leadership style, etc.) that could affect how teams achieve their goals (communicating), being adaptable and sharing the same goals. Fourth, the study relied on respondents' self-reporting of answers that could have been influenced by respondent's own biases or respondent's interpretation of the question. Finally, since the study was conducted as a cross-sectional study, collecting data at one point in time, we can only speculate about how communication or adaptability changes/develops over the course of the project lifecycle.

5.4 Future Research

Additional avenues for future research include using longitudinal methodology (multiple measurements at different points in time) to determine the changes that occur to agile team communication, adaptability, and collaborative goals across multiple sprints or phases of a project. Future research may also be expanded by exploring a larger variety of organizational settings (non-IT organizations, international organizations, local, state, and federal government departments, etc.) to assess if these results apply to different contexts.

In addition to expanding the scope of the current research, it will be beneficial to consider adding additional factors that affect how agile teams function. These may include, but are not limited to: team cohesion; psychological safety; organizational culture; leadership styles; the type of communication tools used; team diversity; and team size, which may provide a better understanding of the key elements that contribute to the success of agile projects.

Additionally, the use of both qualitative and quantitative methodologies (i.e., combining surveys with interviews or case studies) will allow for an even more detailed understanding of team behavior and potentially identify other important characteristics of successful agile teams. Finally, future research may be strengthened through the inclusion of objective measures of project success (e.g., productivity, velocity per sprint, defects, etc.).

5.5 Conclusion

The purpose of this study was to investigate the relationships between the factors of Team Communication, Team Adaptability, Shared Goals and ASDPS, in order to

improve the overall success of Agile Software Development Teams. In using the IPO Model, it was found that the Team Communication factor had a positive impact on Project Success both directly and indirectly by enhancing Team Adaptability. It was also found that the Shared Goals factor contributed to an improvement in Project Success and influenced the degree to which the Team Communication factor influenced Project Success.

From data gathered from professionals in various software development companies in Pakistan, it can be concluded that Agile Teams are most likely to experience significant benefits when they have strong communication, high adaptability and aligned goals. The findings further show that the Team Adaptability variable acts as a mediator in the relationship between the Team Communication factor and Project Success. This indicates that communication will lead to Project Success not only by providing a platform for information exchange but also by allowing Teams to develop a capability to modify their strategy, coordinate and respond to changing customer needs. The findings also show that the Shared Goals variable acts as a moderator; in other words, it shows how goal alignment will influence the way Teams behave. Overall, the results of the study demonstrate that there is a significant interplay between communication, adaptability, and goal alignment that has a substantial impact on the success of Agile Software Development Projects. The findings also support the notion of developing Agile Teams that are able to thrive in rapidly changing project environments and therefore are characterized as being flexible, communicative and goal driven.

Additionally, there are opportunities to include additional variables to help understand how Agile Teams operate. For example, team cohesion, psychological safety, organizational culture, leadership styles, communication technologies, team diversity and/or team size would provide a better understanding of what leads to successful Agile Projects. Moreover, the use of mixed-methodology (i.e., using a combination of survey methods with interviews and/or case studies) would allow for richer and more detailed knowledge about how Agile Teams operate.

Lastly, future research could include objective measures of project success (e.g., productivity levels, sprint velocity and/or defect rates) in addition to subjective assessments, to provide a more complete picture of project success.

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