CAPITAL UNIVERSITY OF SCIENCE AND TECHNOLOGY, ISLAMABAD

Impact of Agile Response to Change on Project Performance with the Mediating Role of Project Complexity and Moderating Role of Team Creativity

by

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

in the

Faculty of Management & Social Sciences
Department of Management Sciences

2021

I would like to dedicate this work to those who always supported and motivated me

CERTIFICATE OF APPROVAL

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Acknowledgement

Then which of the Blessings of your Lord will you deny (**Surah Ar-Rehman**). First and foremost to my creator, my life coach, the most gracious, the most beneficent, **ALLAH S.W.T**, I owe it all to you, Thank you!

There have been many people who have walked alongside me, who have guided me through all these efforts. I would like to outstretch gratitude to each of them. I would like to extend special gratitude to my supervisor, **Mam, Sarah Nawaz Malik**, whose contributions in simulating suggestions and encouragement, helped me to coordinate my thesis work and especially in achieving the results. It was because of your support and guidance from the beginning that I have done it!

Furthermore, I would also like to acknowledge with much appreciation the crucial role of my friends for their support, mentorship, encouragement and technical advice throughout research work. Without you it was not possible!

A special thanks goes to my friend **Haris Jabbar** for being with me all the time during the whole process of thesis writing.

I express my deepest and earnest thanks to my parents for support and motivation for completion of this degree and all. I choose this moment to acknowledge your contributions appreciatively.

I would like to express my cordial appreciation to all those who provided me the possibility to complete this report.

Maria Maqsood

Abstract

Current research literature on project based organizations does not provide detailed explanation on how the project based organizations implement agile methodologies to respond to uncertainties and achieve greater performance. This research paper explores those factors that can be established to contribute in improving project performance. The impact of agile response to change on project performance has been examined. Data were collected from 347 respondents working in various project based organizations of software/IT industry across Pakistan using conveniencev sampling. The results of the study indicate that agile response to change has a significant and positive impact on project performance. The mediating role of project complexity is also significantly positive between the relationship of agile response to change and project performance. The moderating role of team creativity, however, has shown significant impact on the relationship between agile response to change and project performance. The study significantly contributes to the area of research specifically in the domain of project management. The study also provides recommendations for the future researchers primarily within the context of Pakistan.

Keywords: Agile Response to Change, Project Complexity, Team Creativity, Project Performance.

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Abbreviations

APM	Agile Project Management
AR	Agile Response to Change
CT	Complexity Theory
PC	Project Complexity
PP	Project Performance
TC	Team Creativity

Chapter 1

Introduction

1.1 Background of the Study

In today's rapidly changing environment, change is unpredictable and inevitable, in order to deal with uncertainties in the projects different project management approaches are presented (Scholz, Sieckmann & Khol, 2020). In accordance with the available literature, researchers have argued that the traditional project management approaches are no longer feasible in the project environment now a days (Hertogh & Westerveld, 2010). Therefore, in recent years agile project management methodologies are being extensively emerged (Serrado & Pinto, 2015). The concept of agile methodologies has been proposed for the first time in the agile manifesto, which elaborated the set of 12 principles and 4 values, the ability to respond to change is the essential value of APM (Highsmith, Beck, Beedle, & Van Bennekum, 2017; Rasnacis & Berzisa, 2017). To be more specific, the term agility was defined as "the ability to create and respond to change" by (Highsmith & Cockburn, 2001).

Traditional project management approaches are inflexible and fail to respond to customer changes in software development projects (herein after IT projects), unlike agile approaches that allow project teams to quickly adapt with changes matching the modern needs of the IT projects (Papadopoulos, 2015). In software development projects agile has a clear and strong emphasis on rapidly response to change and on people (Highsmith & Cockburn, 2001). Agile project management

refers to a set of iterative and adaptive approaches, which enables project-based organizations to deal with complexities, uncertainties and respond quickly to changes (Kayser, Schmitz, & Ramsauer, 2017; Scholz, Sieckmann, & Khol, 2020).

Thus, it allows projects and organizations to prosper in the rapidly changing, complex and contemporary era of 21st century (Loiro et al., 2019). At large, agile approaches focus on flexibility, continuous advancement, strong interaction among project team and stakeholders, and responding to changes as quickly as possible (Loiro et al., 2019). In 2017 study conducted by CollabNet and Version One showed 97% of respondents' organization were applying agile approaches, whereas 74% respondents indicated more than half of their projects were successful. (VersionOne, 2018).

Researchers have described that the project performance is comprised of three constraints from the "iron triangle" i.e. time, cost, and quality (Bronte-Stewart, 2015). Whereas the project performance is referred by PMBOK with respect to scope, time, quality, cost, and stakeholder/customer satisfaction (PMI, 2008). Furthermore, Serrador and Pinto (2015) have divided the project performance in 2 main groups: one is efficiency factor and the other is stakeholder success factor. The efficiency factor consists of project scope, budget, and time while the stakeholder success factors comprised of team satisfaction, client and consumer satisfaction and the success of the project. Mainly the success of the project is evaluated by major stakeholders. The term performance emphasizes on responding quickly to the rapidly changing market situations in timely manners by mitigating the risk of failure of the project (Chakravarty et al., 2013; Sambamurthy et al., 2003).

Many large software/IT projects end up with the failure due to the poor performance (Patanakul, 2014). Managing large scale IT projects is a complex and crucial activity which requires special expertise, skills, and approaches different from the (TPM) traditional project management approaches (Daniel & Daniel, 2018). Therefore, project-based organizations are striving to improve their overall performance by adapting agile approaches as these approaches are becoming attractive alternative in comparison with the traditional project management approaches (Dikert, Passivaara, & Lassenius, 2016). Several studies have stated that

being agile increases the performance of the organization and helps in gaining competitive edge (Kale, Aknar, & Basar, 2019). Many researchers have found that the agile approaches help organizations to improve performance and gain a competitive advantage (Kumkale, 2016; Ofoegbu & Akanbi, 2012; Yang & Liu, 2012). According to Balaji, Velmurugan, and Subashree (2015) organizations should look beyond and rather to stick with the cost reduction only, they must start focusing on other variables like; speed, flexibility, quality, to ensure the customer satisfaction by meeting their needs on time.

Certainly, the term project complexity is an extensive, rich and versatile concept (Hanisch & Wald, 2014). Daniel and Daniel (2018) have stated that the project complexity is linked to a variety of forms, or project features and properties (Lessard et al., 2014). The project features could be technical and non-technical such as social and organizational ones (De Toni & Pessot, 2020). Technical aspects may consist of location, technological features (e.g. new technologies and integration among components) involved in any project (Lessard et al., 2014). The non-technical aspects consist of interaction and communication among people, behavioral aspect, social aspect, project environment and the external environment (Bosch-Rekveldt et al., 2011; Geraldi et al., 2011). Furthermore, an appropriate dimension of complexity comprises of the word uncertainty and its perception, which involves the novel characters and attributes, experience with past projects, information availability, clarify and ambiguity of information and how it is perceived by teams and the overall project (Bosch-Rekveldt et al., 2011).

Complexity, success and failure of the overall project can be determined by how project teams anticipate, comprehend and manage projects (PMI, 2013). According to Simon (1996), project complexity depends on how it is described. In a project environment, many reasons exist that leads a project towards failure and complexity is one of those reasons (Dao et al., 2016). In general, project complexity influence the outcome of IT projects in a negative way (Butler, Vijayasarathy, & Roberts, 2020). Complexity may cause difficulty in successful completion of projects, resulting in scope creep, budget overrun and schedule delays (Bjorvatn & Wald, 2018: Lu et al., 2015; Qazi, Quigley, Dickson, & Kirytopoulos, 2016). Bakhshi, Ireland and Gorod, (2016) presented a new concept of project complexity

which majorly focuses on the dynamics of the development of the project including pace of the project activities, behavioral aspects of the project team – which exists because of ambiguity in the objective's effecting the project management performance (Bjorvatn & Wald, 2018).

However, complexity can also be considered as positive aspect in projects (Ruoslahti, 2020). It is stated by the Bassett Jones (2005), diversity in projects can enhance creativity and innovativeness among project teams. Complexity in a project may have a negative influence on performance of the project but on the other hand it also may have a positive influence on project results/outcomes (as a result of emerging properties which can create new opportunities (Vidal & Marle, 2008). Therefore, the main focus should be on how to manage project complexity in a constructive way rather than focusing on reducing it or avoiding it completely. Insights from the available literature shows, number of project management strategies have been developed to dealt with complexity in the projects and eliminate its negative effects (Nguyen & Mohamed, 2020). One such strategy is agile response to change (AR) which deals with the project complexity (Nguyen & Mohamed, 2020). Therefore, to manage complex project agile methodologies are widely applied to improve project performance (Lappi & Aaltonen, 2017). Moreover, the higher the agile strategies are used to mitigate complexity, the better the project performance reported (Serrador & Pinto, 2015).

In today's contemporary era, creativity is one of those factors through which an organization can gain advantage over competitors (Ghosh, 2015). Creativity, a source of new ideas, "is a complex and diffuse construct" (Alves, Marques, Saur, & Marques, 2007). The term creativity focuses on cohort of unique ideas. Numerous researchers have found indications and evidence that with the creativity characteristics employees were able to perform effectively on complex and challenging jobs. If they are supervised in a supportive manner, the work produced by employees is more creative (Crawford & De La Barra, 2007). The complex problems that arises in the organizations requires a creative solution Hennessey and Amabile (2010), which off course are implemented by the team members (Thompson & Choi, 2006). One of the key drivers for promoting, creativity and innovation among teams and coping with complexity is Agility (Darvishmotevali, Altinay &

Köseoglu, 2020). Knowledge sharing is one of the other factors which helps in boosting creativity among individuals and team members (Ali et al., 2019). Dynamic entities are referred to creative teams, which evolves as a result of complex interactions among team members and with the project environment (Ilgen et al., 2005). The current study sheds the light on team creativity which is considered as the novel variable to examine association among the project performance and the agile response to change in project-based organizations from software development industry/IT industry in Pakistan.

1.2 Gap Analysis

Many studies have been conducted where the impact of agile methodologies on project performance has been empirically studied along with different variables. Recently, Nguyen and Mohamed (2020) have empirically examined the impact of agile response to change on project performance, but there is still need to empirically inspect the linkage of agile respond to change and project performance in software development industry/IT industry especially in the contextual settings of Pakistan. Agile response to change and project performance are important variables of this study.

Limited studies have been conducted to examine the impact of agile response to change on project performance with the mediating role of project complexity. In general, project complexity is considered as one of the major factors which influence the outcomes of the project in a negative way (Butler, Vijayasarathy, & Roberts, 2020).

However, some of the researchers argue that the project complexity is one of the important factor for any project and it influence the project positively (Ruoslahti, 2020). Therefore, this study aim to examine whether the project complexity plays a positive or negative role as a mediator along with the variables agile response to change and project performance in project based organization from software and IT industry in Pakistan. Also, this study proposes team creativity as a significant moderator between project performance and agile response to change.

Riaz (2017) investigated the moderating effect of managerial support on project complexity and suggested for further research that the dimensions of agile methodologies can be empirically investigated along with other factors such as team creativity. However, the partial theoretical evidence exists in the literature as of yet to explain the impact of AR on project performance specifically in projectile organizations. In this regard, the current study aims to contribute in the existing literature, by making an addition to further explore these areas and study their relationship in detail in the context of project-based organization from software and IT industry in Pakistan. While studying this gap, the study also classifies the potential mediators and moderators. The study suggests that project complexity as a mediator along with the variable. However, the addition of team creativity as a moderator is one of the unique domains which are still needed to be explored in the context of project management and project-based organizations from software development/IT industry. To the best of our knowledge, no empirical study in the project management literature has examined the role of agile methodologies such as response to change in improving project performance in the presence of mediator project complexity and moderator team creativity.

Moreover, there is a room to study these variables in the context of Pakistan because studying these variables together would be very helpful for the project-based organizations from software development/IT industry operating in Pakistan. This study will significantly contribute towards the current literature of the used variables and research study for project-based organizations from software development/IT industry in Pakistan. The moderating role of team creativity among project performance and agile response to change is yet too investigated in the domain of the project management explicitly in the contextual setting of Pakistan.

1.3 Problem Statement

In this contemporary era of 21st century, the conventional project management approaches are becoming obsolete and fails to deal with uncertainties and complexities. For managing the project effectively tremendous advancements have been made, but still there are numerous factors affecting the complex and large-scale

IT projects drastically leaving behind undrawn lessons (Coelho & Valente, 2017; Sangaiah et al., 2017). On the other hand, complexity also offers the prospects to improve project effectiveness and gain competitive advantage if it managed in a right way. (Braun & Hadwich, 2016).

A project manager must have strong knowledge base and skills to utilize agile project management standards successfully and apply these standards to the projects. Project team members must exchange knowledge and develop the culture of strong communication to boost creativity and innovation as effective team communication is a strong source of enhancing team creativity. However, multiple factors can prevent project team members to share their knowledge with others (Ali et al., 2019). Also, a lack of creative thinking among project team members, badly affects the success rate of project-based organizations from software/IT industry.

Therefore, this study aims to focus on the impact of agile response to change with the mediating role of project complexity. The role of project complexity as mediator to improve project performance is still needs to be explored in project management's domain. Furthermore, the moderating role of team creativity between project performance and agile response to change is yet to be explored in the domain of the project management and in the contextual setting of Pakistan. Therefore, this is the novel domain which has not been explored yet along with all the variables (Agile Response to Change, Project Performance, Project Complexity and Team Creativity).

1.4 Research Questions

On the bases of the above stated problems, the intentions of this research study are to find the answers for the following research questions, below is the summary of the questions;

Research Question 1:

Does the relationship exist between Agile Response to Change and Project Performance?

Research Question 2:

Does the Project Complexity mediate the relationship between Agile Response to Change and Project Performance?

Research Question 3:

Does a team creativity play a role of moderator on the relationship of Agile Response to Change and Project Performance?

1.5 Research Objectives

The research objectives of the current study is to explore the relation among the variables in accordance with the projected model. The present study also aims to find out that all the variables (Agile Response to Change, Project Performance, Project Complexity and Team Creativity) are interrelated with each other. In addition, team creativity will be used as a possible significant moderator to identify the strength of relation between project performance and project complexity.

The specific objectives of the present study are as follow.

Research Objective 1:

To explore impact of agile response to change on project performance.

Research Objective 2:

To explore the mediating relationship of project complexity between agile response to change and project performance.

Research Objective 3:

To explore the moderating relationship of team creativity between agile response to change and project performance.

1.6 Significance of the Study

The world is continuously evolving, and the environment is becoming more dynamic and challenging. Therefore, the organizations are majorly focusing on gaining and maintaining the competitive edge by improving their performance, mitigating complexities, and encouraging creativity among team members.

This research study will not only be useful in adding theoretical content in project management but it will also be helpful in providing concrete evidence that how team creativity in the project-based organizations in software industry/IT industry can play a vital role in improving the project performance. It will also be helpful for the project-based organizations of software industry/IT industry in Pakistan to understand and realize the importance of applying agile approaches such as agile response to change and implementation of AR not only to increase the project performance but also to encourage and improve creativity among team members for the existing and upcoming projects.

The present study also provides new aspects for researchers and practitioners specifically in Pakistan to observe and identify the project complexities and how to moderate and minimize its negative effects and maximizing the opportunities in the project.

The present study will also be helpful in fulfilling the theoretical gap existing in previous literature because the research on agile response to change impacts on project performance through mediation of project complexity and moderation of team creativity has not been studied in the project management's domain and contextual settings of Pakistan. The current framework will also provide the foundation to in-depth analyses of existing empirical gaps and to the proposal for directions of future research.

1.7 Supporting Theory

Many theoretical perspectives have been presented by different researchers which are widely used to support the studies of agile approaches and methodologies,

project complexity and project performance like agile theory of general relativity, agile governance theory, theory of constraints, but complexity theory can cover all the related variables of this study.

1.7.1 Complexity Theory

Complexity theory has been around for a long period of time, however related concepts of complexity has been emerged in the mid-late 20th century across a wide variety of disciplines particularly in the field of biological, physical, and social sciences (Schneider & Somers, 2006; Balandier, 1988). Kauffman (1993) has proposed the concept of complexity theory in social sciences which was further carried out by (Mattews et al., 1999). This theory allows us to better understand the complex systems (Zimmerman et al. 2001).

Several researchers have used complexity theory (CT) as a generic umbrella term comprises of a group of theories of complex systems which includes, complex adaptive systems, complex dynamic systems, self-organization systems (Balandier, 1988; Cameron & Larsen-Freeman, 2007; Burnes, 2005). Each of them emphasis on slightly different aspects, but majorly focuses on systems that are complex, dynamic, nonlinear, chaotic, sensitive, unpredictable, feedback sensitive, open, self-organizing and adaptive (Larsen-Freeman, 1997). Many researchers have observed that the complex systems are network of connected and interdependent parts. The theory of complexity advocates that the organizations are the self-adaptive systems inherited with the complexity (Saynisch, 2010). Organizations are concerned with reference to the continuously changing environment (Burnes, 2005).

The aforementioned theory exhibits the concept as self-evolution, emergence and non-linearity which is the evolving phenomenon discussed in project management; undertaking a paradigm shift from predictability to adaptability (Cooke-Davies et al., 2007). The world adaptability refers to the ability to respond to changes, make alteration in the process and learn from past experiences (Zimmerman et al. 2001). The chaotic and complex environment acts as a catalyst to uplift the complexity in any project and restrain the project performance; requiring the

management literature to change from certainty to compliance (Jaafari, 2003). Complexity theory is a concept that is used to manage the teams in a project to breed creativity required to complete the project goals (Rose & Kodukula, 2011).

Therefore, the project-based organizations must shift from traditional approaches to agile methodologies while facing uncertainty and changing conditions. Agile principles consider uncertainty and mange it, based on an iterative, interactive, learning, and human-centered approach (Khoshroo & Rashidi, 2009). Saynisch (2010) suggested that project teams should be creative and adaptive in order to deal with the complexity situations, thereafter, supporting the proposed model where agile methodologies allows project teams to mitigate the inherent complexity of the project through their creative thinking in order to provide the better project performance.

Chapter 2

Literature Review

2.1 Agile Response to Change

The concept of agile methodology was projected in Agile Manifesto by 17 experts Fowler and Highsmith (2001), comprising of 12 principles and core values (Ćirić & Gračanin, 2017). Agile is a responsive and adequate approach which is widely used in delivering software projects (Dumrak, Mostafa & Hadjinicolaou, 2020). In technology projects agile methods are generally applied (Lindvall et al. 2002) because they have the ability to tackle the problems and challenges associated with the large scale and dynamic projects in continuously evolving and changing environment (Serrador and Pinto 2015). Even though APM is intensely embedded in software projects, in the 6th edition of (PMBOK), by Project Management Institute (PMI, 2017) encouraged the use of APM approaches in planning and execution of the project for non-IT development environments as well (Dumrak, Mostafa & Hadjinicolaou, 2020).

The four values of agile that were suggested in the Agile Manifesto are: (1) "Individual and interactions over process and tools"; (2) "Working software over comprehensive documentation"; (3) "Customer collaboration over contract negotiation"; (4) "Responding to change over following a plan" (Fowler & Highsmith, 2001). In the 21st century, the Agile philosophy is a best fit with the business reality (Denning, 2015), as agile methods directly tackle the challenges which are associated with projects in rapidly changing environments (Serrador & Pinto,

2015). The ability of project management team member's to respond to the project difficulties and challenges plays an essential role in managing project success or failure (Serrador and Pinto 2015).

2.2 Project Performance

The accomplishments and achievements of goals of a project measures the performance of a project which is referred as project success (Zaman et al., 2019). There are various criteria which are used to evaluate project performance such as efficiency, impact on project team and customers, and business success etc (Tam et al., 2011; Turner & Zolin, 2012; Chang et al., 2013). When evaluating project performance, there are multiple indicators taken into considerations (Pinto & Slevin, 1988; Dvir, Lipovetsky, Shenhar & Tishler, 1998, Boyne & Gould-Williams, 2003).

Several researchers have agreed that the project performance can be measured with regards to time, cost, and scope: commonly known as triple constraints, alongside the quality and stakeholder satisfaction. (Atkinson, 1999; Ika, 2009; Bosch-Rekveldt et al., 2011; Serrador & Pinto, 2015). Completing the project objectives within the project constrains can determine the success of the project (Ika, 2009). The performance of IT projects was recently evaluated with respect to cost, time, quality, and customer's satisfaction by (Zaman et al., 2019).

2.3 Project Complexity

Complexity is one of the critical factors that are involved in any project (Baccarini, 1996). Complexity in a project is perceived as a rich construct Geraldi, Maylor, and Williams (2011) and Hanisch and Wald (2014), which is associated with the different project factors (Lessard et al., 2014). The term project complexity has categorized into two broad aspects, the first one is taxonomy i.e. the number of interconnected parts or elements in a project and their interdependency on each other, and the second one is uncertainty involved in a project (Williams, 1999). TOE framework has been proposed in 2011 by Bosch-Rekveldt (2011) consisting

of technical, organizational, and environmental factors to measure the complexity in a project. The term is further defined by Vidal et al. (2011a) as, "the property of a project which makes it difficult to understand, foresee and keep under control its overall behavior, even when given reasonably complete information about the project system".

2.4 Team Creativity

Creativity refers to the formation of thoughts, unique concepts, procedures, and solutions by project team members (Amabile, 1997; Dong, Bartol, Zhang & Li, 2017). Team creativity has defined as "the production of useful ideas about products, services, procedures, and processes by a project team member working together" (Shin & Zhou, 2007). Sutton and Hargadon (1996) stated that teams can serve as an important vehicle for the development of creative and novel ideas. At team level, creativity encourages the interpersonal communication among team members (King and Anderson, 1990). Also enhancing and sharing knowledge among project team members encourage creativity (Ali et al., 2019).

2.5 Agile Response to Change and Project Performance

The term project is referred as a distinctive and short-term undertaking carried out individually or on organizational level that lead towards a new product, service, or outcome (APM, 2012; PMI, 2017). Collins and Baccarini (2004), and Barclay (2008) stated that the project performance success is typically considered as the project success, product success, and overall project management success. Over the years, the ways of measuring project performance, referred as project success" and how to accomplish the project success have gradually evolved (Tam et al., 2020). Evaluation of the project's performance is highly depended on how effectively project's objectives are achieved within the project management constraints such as quality, schedule, budget, and other project achievement measures (Ika,

2009). There are various criteria which are used to evaluate project performance such as efficiency, impact on project team and customers, and business success etc (Tam et al., 2011; Turner & Zolin, 2012; Chang et al., 2013). Several researchers have found an important correlation among efficiency and the overall success of the project. According to Shenhar et al. (1997), three traditional dimensions of project efficiency: time, budget and scope, determines the project success but the scope plays a major role and it has a direct impact on customer satisfaction.

One of the frequently used criteria to evaluate project performance is Key Performance Indicator (KPI) (Beatham, Anumba, Thorpe, & Hedges, 2004). The project performance variable comprises of 6 sub-variables which includes time, cost, quality, productivity, safety, and project environment (Soemard, Wirahadikusumah, & Abduh, 2006). In order to review the project progress and to identify new opportunities for improvement, project performance should be measured continuously on a regular basis throughout the overall project (Thomas & Thomas, 2005).

In software development projects, the project success has been defined by Chow and Cao (2008) by using four attributes: scope – meeting all the project objectives, time – delivering the project within the schedule, cost – delivering the project within estimated cost, quality (delivery the high quality and good product or project outcome to customers). Popaitoon and Sigenthai (2014) stated that the extent to which the outputs and outcomes of a project satisfy the schedule and budget goals, operational and technical specifications, and the customers' business needs determines the performance of a project.

In this contemporary era when competition is intensified, technological advancement is rapid, and market demands diversified, agility, Conforto et al., 2016), is imperative (Lee & Xia, 2010). Therefore, in today's dynamic and uncertain environment, agility is one of the keystones for constant novelty and performance competitiveness (Denning, 2013). It has been observed that the agility is required for the innovation and organization's performance competitiveness (Sambamurthy et al., 2003).

Ghezzi and Cavallo (2018) has stated that the agility concept has been emerged

from the software-based development projects, but slowly moved to the multi-faceted business models development and complex services. The positive effect of agile methods has been observed particularly for managing the processes that are said to be innovative (Meyer and Marion, 2010). In dynamic and rapidly changing business conditions, agility has a vital role in improving project performance (Haider & Kayani, 2020). In the context of project performance, a recent study has conducted indicating the positive association among AR and project performance. Agile methods have a positive effect on the performance of the projects in order to preventing them from schedule delays and running over budget (Nguyen & Mohamed, 2020).

Agile principles focuses on adaptive planning, continuous improvement, evolving development, and early delivery of a project (Mendez, 2018). Agile methods are manifest by individuals and interactions, extensive customer collaboration, working with software, and responding to changes (Papadakis & Tsironis, 2018). In software industry, rather than completing and delivering the project at once and taking the risk of total failure, agile methods deliver a project instead, take the customer response and use to improve the project to deliver the better version (Fowler & Highsmith, 2001).

Agility allows projects to achieve high quality, novelty, flexibility, ability to quickly respond to changes and to meet customers' needs and desires in a changing market (Ravichandran, 2018). Agility is basically the optimal balance between needs for stability and adequate level of flexibility (Ciric et al., 2019). Agile approaches promise variety of benefits like; on-time project delivery, stakeholder satisfaction and delivering other business values with quick iterations (Papadakis & Tsironis, 2018). However, commitment, collaborative communication, and a culture willing to take new challenges is required while adapting agile methodologies (Lopez-Martinez et al., 2016). Cockburn and Highsmith (2001a) stated agile methods were anticipated from a perspective that mirror today's business instabilities and technological changes.

The ever changing demands from customers and intense industrial competition have forced organizations to seek for innovative alternates and approaches (Farr,

Ganguly, & Young, 2012). Being Agile is one of the innovative approaches compared to traditional project management, to recognize changes, deal with uncertainties, and to take advantage of new or emergent opportunities (Ciric & Gracanin, 2017). A significant change has been observed by the researchers, when organizations are adapting agile approaches to manage, organize and execute their projects (Dingsoyr, Nerur, Balijepally, & Moe, 2012: Stettina & Hörz, 2015).

While using agile approaches, initial targets are established, and basic outcomes are defined, however, by using an adaptive process the project outcomes are revisited consistently in order to further refine the project objectives (Gemino, Horner Reich, & Serrador, 2020). An adaptive process, referred as responsiveness towards change, can give control over unpredictability (Fowler & Highsmith, 2001) which ultimately leads to improved project performance. Ravichandran (2018) recognized that how a project can attain an economical benefit and improve its project performance when it is supposed to be strategically agile. The available literature on agile methods claims that when compared with traditional methods, the agile methods provide numerous performance advantages (Sheffield & Lemétayer, 2013; Stoica, Mircea, & Ghilic-Micu, 2013; Dubey, Jain, & Mantri, 2015; Serrador & Pinto, 2015). According to Lindvall et al. (2002) agile methods are widely used in software projects because they can precisely handle the challenges while dealing with the complicated projects (Lindvall et al., 2002). The critical element in an agile approach is the ability to adapt to changes (Shenhar et al., 2001; Boehm & Turner, 2003; Aguanno, 2004). The ability to react and respond to these difficulties of a project management team plays a crucial in the success or failure of the project (Park et al. 2017). The extensive use of agile approaches in project management showing signs that the agile approaches results in improved project success (Conforto et al., 2014; Serrador & Pinto, 2015; Jørgensen, 2019). Therefore, the higher the agile methods used in the project, the higher the project performance will be reported (Serrador & Pinto, 2015).

Hence, this suggests the first hypothesis.

H1: There is a positive relationship between agile response to change and project performance.

2.6 Mediating Role of Project Complexity between Agile Response to Change and Project Performance

In the context of project management, complexity is the most important topic, at the same time it is very controversial (Bakhshi, Ireland, & Gorod, 2016). Complexity is defined as "the property of a project which makes it difficult to understand, foresee and keep under control its overall behavior, even when given reasonably complete information about the project system (Vidal et al., 2011). To be more precise, complex projects are inclined to schedule delays and budget overruns (Hertogh & Westerveld, 2010; Lu et al., 2015).

A project is considered as complex, when it is extremely dependent on its (political, economic, or legal) environment, with continuously changing stakeholders demands, requirements and having conflicting stakeholders' interests Chapman (2016), and become more complex when there is an inadequacy of information and too many variables are involved simultaneously (Pitch et al., 2002). It is widely reported in literature, that the projects have become more complex over time (Baccarini, 1996; Harvett, 2013; Hillson & Simon, 2007; Philbin, 2008; Williams, 1999).

When projects are discussed, the term 'complexity' has become a critical and important aspect (Wood & Ashton, 2010). In the context of project management, complexity is the most important variable to be focused on (Baccarini, 1996). Bjorvatn and Wald (2018) argued that project complexity one of the potential and important determinants of project management performance, as measured by delivering project on time and within budget. Solving complex tasks is the explicit aim to establish projects (Hobday, 2000).

Many researchers have found and identified various factors that can the outcomes of software development projects/IT projects, one of those factors is project complexity (Butler, Vijayasarathy, & Roberts, 2020). Project complexity has been reported as the main factor having a negative effect on project performance (Floricel et al. 2016; Luo et al. 2017). In a project environment, there are a lot of sources

exists to increase complexity in projects, such as requirements ambiguity, less clarity of scope, barriers in communication, (Remington, Zollin, & Turner, 2009).

Researchers argue that the perception of complexity in a project is dependent on the cognitive level such as knowledge, experience, background, personality of the people involved (Fioretti & Visser, 2004; Jakhar & Rajnish, 2014; Remington et al., 2009). The project complexity also arises from the interactions among various organizations forming a project organization, the collaboration and interaction of different elements inside the same organization, the requirement for coordination among several project elements, and wide range of project management methods, tools, and techniques used (Association for Project Management, 2008).

For project manager and team members it is very important to understand project complexity. The project environment is continuously evolving and becoming more and more complex and challenging therefore the project managers are experiencing large number of complex situations during project lifecycle (Daniel & Daniel, 2018). The multifaceted nature of a project and interrelated elements also contributes to project complexity, it is very hard to measure (Bosch et al., 2011; Gransberg et al., 2013). The complexity of a task is the degree of difficulty and the amount of thinking, time and knowledge required to perform the task (Kermanshachi et al., 2016).

Complexity can also be considered as positive aspect in projects (Ruoslahti, 2020). Complexity can be a source of risks or opportunity therefore the important thing is to properly manage project complexity in order to reduce its negative effects and at the same time taking advantage of the opportunity created (Kermanshachi et al., 2016). It is stated by the Bassett Jones (2005), diversity in projects can enhance creativity and innovativeness among project teams. Complexity in a project may have a negative influence on performance of the project but on the other hand it also may have a positive influence on project results/outcomes (as a result of emerging properties which can create new opportunities (Vidal & Marle, 2008). Therefore, the main focus should be on how to manage project complexity in a constructive way rather than focusing on reducing it or avoiding it completely. In today's dynamic environment, only those project based organizations from software development industry who manage to deal with the project complexity and

improve their project performance will succeed. A high rate of project failures is a phenomena which is experienced by both advanced and developing nations especially in the software industry (Ebad, 2016).

The performance of the software development project/IT projects has its wide impact on different industries and business management processes e.g. operational planning and control, HR management, inventory management, supply chain management etc. (Holmes, 2018; Pellerin et al., 2013). Bozarth et al. (2009) stated that complexity decreases the end performance of the project. Project complexity and its characteristics that influence the project performance have been explained by several researchers in the literature, e.g. size of the project, schedule, interdependency among various activities or elements etc. (Cicmil, 2003; Cicmil & Marshall, 2005; Benbya & McKelvey, 2006; Abdou et al., 2016).

The numerous interlinked activities involved in a project makes it complex and effects the project performance (Tatikonda & Rosenthal, 2000; Yang et al., 2014; Laine et al., 2016). The degree of uncertainty (Williams, 1999) and interdependency among activities or tasks arises project complexity (Hass, 2009), which hinders the project performance (Tatikonda & Rosenthal, 2000; Bjorvatn & Wald, 2018). Due to the size, novelty, technology advancement and many other reasons projects are becoming more and more complex, hence contributing towards late delivery, budget overrun and poor performance (Bosch-Rekveldt et al., 2011). According to researchers, one of the main causes of budget overrun and schedule delays is project complexity leading project towards poor performance and consequently project failure (Kaming, Olomolaiye, Holt, & Harris, 1997; Lu et al. 2015; Bjorvat &Wald, 2018).

Many researchers and practitioners have investigated that the budget overrun, and schedule delays are considered as a main causes of project failure (Turner & Zolin, 2012). Whereas, the concept of project performance is broader than usual, as it involves the objectives of all stakeholders throughout the project life cycle (Bjorvatn, & Wald, 2018). The project performance is measured by the emergent properties, ability to manage and cope up with the project complexity level (Zhu & Mostafavi, 2017). The interaction among product and processes also plays a vital role to enhance the project complexity and effect the performance of the

project in terms of delays etc. (Bailey et al., 2010). Previous studies showed that the causes of poor project performance can be grouped into external causes and internal causes (Meng, 2012).

External causes are those which are usually beyond the control of project team members, such as adverse weather conditions, unforeseen site conditions, market fluctuation, and regulatory changes while internal causes of poor performance may be generated by stakeholders such as client, designer, the contractor etc., (Assaf & Al-Hejji, 2006). Therefore, understanding stakeholders' requirements play a vital role in overcoming project complexities. In project management settings, the traditional methods are built on plan-driven linear strategies Boehm and Turner (2005), therefore the projects requirements were mostly clear and well-defined (Wysocki, 2014). Hence the low probability of changes in project requirements creates a predictable environment with the least uncertainty allowing the management to concentrate on adherence to the plan and the success of the project. Whereas the agile methods distinctively, emphasize on the ability to responds quickly to changes and consequently to varying customer needs and requirements (Qumer & Henderson-Sellers, 2008).

Kaim, Härting, and Reichstein (2019) stated that in today's developed and quickly changing world, uncertainty is becoming normal. The main objective of agile is to increase the relevance, quality, flexibility, and business values in the project (Sohi et al., 2016). A significant change has been observed by the researchers, when organizations are adapting agile approaches to manage, organize and execute their projects (Stettina & Hörz, 2014). Number of project management strategies have been developed to overcome the challenge of project complexity and moderate its negative effect from project. One such practical project management strategies used to deal with complexity in projects is agile response to change (Nguyen & Mohamed, 2020).

To mitigate the increasing complexities in projects, agile methodologies are used in order to deliver projects successfully. The study conducted by Sohi et al. (2016) explored that agile methodologies influence projects in a positive way to cope up with the complexities. Several researchers argued that one of the key factors which makes a project complex is change, different parts of projects are interconnected,

therefore the change in one cause spontaneous shift in other activities (Atkinson, 1999).

Four dimensions of agility are described by Goldman et al., (1995); (1) "enriching the customer", (2) "cooperating to enhance competitiveness"; (3) "organization to master change and uncertainty" and (4) "leveraging the impact of people and information". Whereas numerous researchers majorly focus on the ability to quickly respond to change (Yusuf, Sarhadi, & Gunasekaran, 1999; Dove, 2002).

Unlike the traditional project management approaches, agile approaches aim to embrace change and uncertainty by relying on highly iterative development of a project's goals and content and by emphasizing informal collaboration (Dyba & Dingsøyr, 2008). Agility not only provides the ability to respond to unforeseen changes but also to act proactively with regards to those changes (Arteta & Giachetti, 2004). Agile methodologies were developed to enable greater flexibility and responsiveness to the changing conditions in a project to improve project performance (Fowler & Highsmith, 2001). Agile methodologies are commonly applied for managing complex projects to improve project's performance (Lappi & Aaltonen, 2017).

Hence my second hypothesis can be stated as:

H2: Project complexity plays a mediating role between agile response to change and project performance.

2.7 Moderating Role of Team Creativity between Agile Response to Change and Project Performance

Team creativity develops a link between individual and organizational creativity. Organizations often assign complicated projects to teams so that they may generate new and creative ideas, and transmit visions into beneficial technology, products, or services (Iansiti, West, & Ilustraciones Horii, 1997; Chen, 2006). Team creativity is defined as the production of novel and useful ideas concerning

products, services, processes, and procedures by a team of employees working together (Shin & Zhou, 2007). It is a product of influence and interaction among team members, rather than isolated efforts of an individual (Grosser, Madjar, & Perry-Smith, 2014). Team creativity can be observed as the incorporation of individual proficiency and inspiration (Taggar, 2002). Team member creativity is an inherently social process that builds on and incorporates individual knowledge and skills at the project level (Kratzer et al., 2010).

In fostering creativity among teams, social network plays a vital role by providing domain specific knowledge Perry-Smith (2006), and facilitating those processes encourage creative thinking (Li, Li, Guo, Li, & Harris, 2018). An important source of creativity is knowledge sharing. Hence, organizations implement rigorous knowledge management strategies to promote creativity among employees (Ali, Ali, Leal-Rodríguez, & Albort-Morant, 2019). Due to several challenges faced in the field of project management such as uncertainty, complexity, and use of diversified teams, effective knowledge management is essential (Bosch-Sijtsema and Henriksson, 2014). There is an argument by many researchers that in software development projects the knowledge is effectively managed through exploiting and reconfiguring available knowledge assets and exploring newly gathered knowledge is imperative to cope with the risk related to software product and projects Neves et al., (2014) and successfully complete the project on time (Akgün, Keskin, Cebecioglu, & Dogan, 2015; Aurum, Daneshgar, & Ward, 2008).

It is recognized in the literature, the project team members with greater experience and background in project-based work are typically more proficient at completing their assignments, working together collaboratively, and performing tasks efficiently (Pinto et al., 1993). Numerous researchers have found indications and evidence that with the creativity characteristics employees were able to perform effectively on complex and challenging jobs. If they are supervised in a supportive manner, the work produced by employees is more creative (Crawford & De La Barra, 2007). Several researchers stated that team member's effective collaboration is considered as the key success factor in projects (Gransberg et al., 1999; Vaaland, 2004). Collaboration is associated to the performance of a project team (Chiocchio et al., 2012). Evidence has shown that, under certain supportive

contexts, teams composed of employees with differing functional or educational backgrounds tend to be more creative (Wang, Kim & Lee, 2016). Team members evaluate and monitor their current performance in relation to the goals associated with the project to make it successful (Shin, Kim, & Lee, 2017). In the context of project management, performance is a leading factor that makes any project success or failure (Wang & Huang, 2006). Successful project performance refers to the creation of unique ideas, processes, or solutions to handle the complex tasks (Amabile, 1983; Shalley, 1991).

Software development projects are complex in nature therefore requires novel and innovative ideas that comes from project team members. In today's complex and dynamic environment, team creativity is essential for organizational innovation, survival, and growth (Anderson, Potočnik, & Zhou, 2014; Zhou & Hoever, 2014). Diversified team members involved in a project having extensive knowledge base ultimately leads to increased creativity among team members, innovation and hence, improve project performance (Ali & Park, 2016). Creative ideas can be developed through interactions among team members (Gilson & Shalley, 2004; Hargadon & Bechky, 2006). So, creative team members tend to be more responsive, adaptive towards complexities arises during a project lifecycle, to expend their knowledge base and to improve the overall performance of the project. In order to respond with agility to change, the project team members should work together, having frequent communication and must be able to divide the work load (Lindsjørn et al., 2016). As the agile manifesto states that the self-organizing teams successfully accomplish the project objectives. In the agile literature the collaboration and coordination among team members plays a central role (Sharp and Robinson, 2010; Strode et al., 2012). One of the key drivers for promoting, creativity and innovation among teams and coping with complexity is being Agile (Darvishmotevali, Altinay & Köseoglu, 2020).

Hence my third hypothesis can be stated as:

H3: Team creativity moderates the relationship between Agile Response to Change and Project performance; such that if team creativity is high then the relationship between agile response to change and project performance would be strengthened.

2.8 Research Model

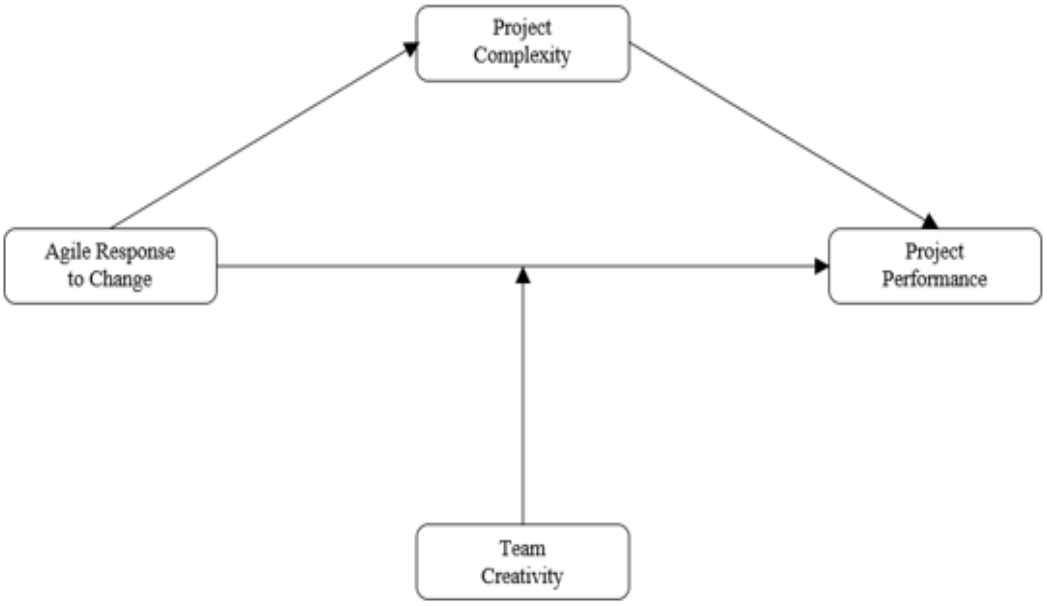

FIGURE 2.1: Research Model Shows the Impact of Agile Response to Change on Project Performance through Project Complexity: Moderation of Team Creativity

The current study is being executed with the purpose to identify the impact of agile response to change on project performance, how project complexity mediates the relationship between agile response to change and project performance and how team creativity act as a moderator between agile response to change and project performance. The above framework is showing independent variable (Agile Response to Change), dependent variable (Project Performance), mediating variable (Project Complexity), and moderating variable (Team Creativity) and the relationship exists between these variables. The main aim of this present study is to identify links between these variables.

2.9 Research Hypothesis

$\mathbf{H}_1$: There is a positive relationship between agile response to change and project performance.

$\mathbf{H}_2$: Project complexity plays a mediating role between agile response to change and project performance.

$\mathbf{H}_3$: Team creativity moderates the relationship between Agile Response to Change and Project performance; such that if team creativity is high then the relationship between agile response to change and project performance would be strengthened.

Chapter 3

Research Methodology

The succeeding chapter consist of all the details regarding procedures, methodologies and approaches applied in this research study in order to perform analysis and get valid results. The following section comprises of all the particulars regarding type of study, research philosophy, unit of analysis, time horizon, population and sample, sampling techniques, instrumentations, statistical tools, covariates, reliability indexes of the variables, data analysis techniques and analytical tools and techniques used in this research.

3.1 Research Design

3.1.1 Type of Study and Study Setting

The current research is carried out to highlight the impact of agile response to change on the project performance, by studying the correlational effect among these two variables. For this study, the targeted population is from project-based organizations from software industry of Pakistan, in order to get the required data for the reliable results. Primarily 380 questionnaires were distributed to collect the responses among the target respondents, but 347 genuine responses were received. The research sample of this study is assumed to be representative of the overall population of project-based organizations from software industry of Pakistan. The

present study will assist in results generalization from the sample characteristics that are to be demonstrated by the whole population of Pakistan.

3.1.2 Research Philosophy and Quantitative Research

The hypothetical deductive research method is implemented to this study, which is an anticipated description of scientific method, which is built on the philosophy of finding reality by using data, in which previous research and existing theories were used to demonstrate and support the proposed hypothesis which will then be empirically tested for verification of the anticipated hypothesis.

According to this hypothetical deductive method, scientific tests initiates by framing a hypothesis based on the current literature that may be accepted or rejected when applying different statistical tests on the data against each items which are used to measure the relative statements. If the results are favoring the proposed hypothesis, the hypothesis is said to be accepted otherwise rejected as per the supporting theory.

It is then proposed to compare the descriptive value of competing hypotheses by testing how strongly they are authenticated by their predictions. To reach a large-scale population, generally quantitative methods are preferred. Therefore, in this research quantitative approach has been utilized to collect the data for the variable demonstrating the relationship among variables used in this study.

3.1.3 Unit of Analysis

Unit of analysis is one of the most important characteristics in any research study. In this research study unit of analysis may vary from an individual to different groups, organizations, cultures, etc. Since the present study is designed on dyadic relationship i.e. the impact of agile response to change on the project performance, therefore the employees of the projected organizations from software industry were unit of analysis.

In order to evaluate the impact of agile response to change on project performance study targets the project-based organizations from software industry which

basically required to implement agile approaches and methodology to be able to responsive towards rapidly changing market conditions and improve project performance.

3.1.4 Time Horizon

This research is limited to a specific time frame and hence the cross-sectional time horizon is used. Therefore, the data were collected in four weeks' time and were collected at once.

3.2 Population and Sample

For this study, the population is comprised of all the project manager and project team members working in project-based organizations from software industry in Pakistan. Data for this study were obtained from both national level and international level project-based organizations functioning in major cities of Pakistan. Therefore, the sample largely comprises of Pakistan's project-based organizations operating in Lahore, Islamabad and Rawalpindi. The data is collected with the aim measure these four variables of concern i.e. Agile Response to Change, Project Performance, Project Complexity and Team Creativity. The questionnaires were distributed in English among respondents.

3.3 Sample and Sampling Techniques

Due to resource constraints such as time and budget and other certain restrictions, it is nearly impossible to collect data from the entire population. For collection of the data different sampling procedures are used. For this present study, a group of individuals are chosen who the true representative of the whole population are. Only project-based organization from software industry of Pakistan are considered, for this specific study.

The data on independent variable (i.e., Agile Response to Change), dependent variable (Project Performance) as well as the mediating variable (i.e., Project

Complexity) were reported by the projects employees who had a direct impact on the project performance, including the project managers, and project team members. However, support staff was excluded from this group. The data on moderator of this study i.e. team creativity has been obtained from the project managers. Almost 380 project managers and project employees were approached in total for data collection, however 347 genuine responses were received. For the reporting purpose, the data on team creativity obtained from project managers were merged and described as averages, which indicated that there is certainly no threat of common method variance exists. Convenience sampling technique was used to collect the data. The reasons of using this technique is the lack of time and resources constraints. It is one of the techniques of non-probability sampling that is used for this study, in which data has been collected randomly and based on the feasibility of the effective data collection. We have taken care the confidentially and privacy concerns of the respondents by stating the confidentially clause in the cover letter.

3.4 Sample Characteristics

The demographics that are considered in this study includes project manager's and project team's age, experience in the project based-organizations from software industry, information about gender and qualification. It was a dyadic relationship, so the questionnaires were filled by 2 different groups, one to be filled by the project managers and the other one to be filled by the project team members. Sample characteristic's details are as follows:

3.4.1 Gender

Gender is an important component in order to maintain gender equality and is also considered as the main element of the demographics. In this present study, it has been tried to maintain the privilege of gender equality but still it has been observed that ratio of male respondents is extensively greater than the ratio of female respondents.

TABLE 3.1: Gender Distribution

Gender	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
Male	240	69.2	69.2	69.2
Female	107	30.8	30.8	100
Total	347	100	100	

Table 3.1 depicts the gender composition ratio of male and female respondents. The above tabular data shows that the male respondents is greater than the female as there were 69.2% male respondents and 30.8% were female respondents.

3.4.2 Age

Age is also considered as one of the important elements of demographics in research study, but respondents sometimes feel uncomfortable to disclose their age openly. That is why, for their convenience, scale/range was used to collect information regarding the respondents' age.

TABLE 3.2: Age Distribution

Age	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
18-25	129	37.2	37.2	37.2
26-35	153	44.1	44.1	81.3
36-45	52	15	15	96.3
46-55	13	3.7	3.7	100
Total	347	100	100	

Table 3.2 depicts the composition of respondent's age group. 37.2% respondents were from the age group of 18-25, 44.1% were from the age group of 26-35, 15.0% were from the age group of 36-45, whereas only 3.7% were from the age group of 46-55, that means most of the respondents of this study were from the age group of 18 – 25 and 26-35 years.

3.4.3 Qualification

After age and gender, qualification is another important dimension of the demographics. Education unties several new and unique ways for success and creativity in order to gain competitive edge around the globe. Probably education plays a vital role in demonstrating creativity and innovativeness among project team members.

Table 3.3: Qualification Distribution

Qualification	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
Undergraduate	41	11.8	11.8	11.8
Graduate	116	33.4	33.4	45.2
Masters	112	32.3	32.3	77.5
Mphil/MS	68	19.6	19.6	97.1
PhD	7	2	2	99.1
Other	3	0.9	0.9	100
Total	347	100	100	

Table 3.3 depicts the qualification level among the respondents, 11.8% were undergraduate, 33.4% were graduate, 32.3% were masters qualified, 19.6% were mphil/MS qualified, 2% were PhD qualified, and only 0.9% were from the other educational background, this means that most of the respondents of this study were highly qualified personnels.

3.4.4 Experience

Different ranges were used to collect the information regarding the experience of the respondents. Experience considers the acquisition of knowledge over the period, allowing project team members to adopt new strategies to improve the performance of the project.

Table 3.4: Experience Distribution

Experience	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
5 and Less	170	49	49	49
6-10	86	24.8	24.8	73.8
11-15	51	14.7	14.7	88.5
15-20	33	9.5	9.5	98
Above 20	7	2	2	100
Total	347	100	100	

Table 3.4 depicts the experiences composition of the respondents. The data shows that 49.0% respondents were having job experience of (5 or less than 5 years), 24.85 respondents were having job experience ranging from (6 – 10 years), 14.7% respondents were having the job experience ranging from (15 -20 years), and 7% respondents were having job experience above 20 years.

3.4.5 Level

The level represents the job position of the respondents in the organization, whether they are the project manager or working as a project team member. As we know that both the project manager and the project team members play a very important role in the successful completion of any project on time and budget which are the most fundamental factors for the project performance

Table 3.5: Level Distribution

Level	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
Project Manager	83	23.9	23.9	23.9
Project Team Member	26.4	76.1	76.1	100
Total	347	100	100	

Table 3.5 depicts the level of the respondents in their organization. The above data shows that 23.9% respondents were project managers and 76.1% were the project team members.

3.5 Instrumentation

3.5.1 Measure

The current study consists of a closed-ended questionnaire adopted from different sources which are utilized for assessing four variables. It was directed to the various groups of manager and project team of the project-based organizations from software industry. The questionnaires have been distributed online to get the quick responses. Previous researchers also suggested that the online data collection is more convenient as compared to paper-pen method.

According to the nature of research, items included in the questionnaire i.e. Agile Response to Change, (Mediator) Project Complexity, and Projected Performance were reported by both project team members and project managers, whereas the moderator of this study i.e. team creativity were reported by project managers only. The responses are tapped with a rating scale for each section. Questionnaires also covers demographic variables like Gender, Age, Qualification, and Experience. Around 380 questionnaires are distributed among respondents to get the data.

3.5.2 Agile Response to Change

A six-item questionnaire was adapted for Agile Response to Change constructed by (Nguyen & Mohamed, 2020). The responses will be tapped using a 5-point Likert scale where 1 represents "strongly disagree" and 5 represents "strongly agree".

The items of scale are as below:

1. "The project management team had the abilities to respond to political changes that affected the project"
2. "The project management team had the abilities to respond to economic changes that affected the project"
3. "The project management team had the abilities to respond to policy changes that affected the project"

4. "The Project management team had the abilities to respond to social value changes (e.g. awareness of environmental issues, safety standard and climate change) that affected the project"

5. "The Project management team had the abilities to respond to technology changes that affected the project"

6. "The Project management team had the abilities to respond to technology changes that affected the project".

3.5.3 Project Performance

A six-item questionnaire was adapted for Project Performance is constructed by (Nguyen & Mohamed, 2020). The responses will be tapped using a Rating scale which includes "significantly under, slightly under, on time, slightly over, significantly over" to measure the project performance. The rating scale for this variable varies for each item used.

The items of scale are as below:

1. "Extent to which the project was delivered on schedule"

2. "Extent to which the project was delivered on budget"

3. "Extent to which the project scope expectations were met"

4. "Extent to which the project's quality objectives were met"

5. "Extent to which my organization achieved its desired project outcomes"

6. "Number of project stakeholders that achieved their desired project outcomes"

3.5.4 Project Complexity

A seven-item questionnaire was adapted for Project Complexity is constructed by (Nguyen & Mohamed, 2020). The responses will be tapped using a Rating scale

which includes "very low, moderately low, similar number, moderately high, very high" to measure the project performance. The rating scale for this variable varies for each item used.

The items of scale are as below:

1. "The number of different organizations involved in the project"
2. "The number of distinct disciplines, methods, or approaches involved in project execution"
3. "Level of stakeholder agreement about the project outcomes"
4. "Level of importance of legal, social, or environmental implications on project execution"
5. "Overall financial impact (positive or negative) on the projects and stakeholders"
6. "Level of importance of the project to my organization"
7. "Level of stability of the overall project context"

3.5.5 Team Creativity

An eight-item questionnaire was adapted for Team Creativity constructed by (Ali, Ali, Leal-Rodríguez, & Albort-Morant, 2019). The responses will be tapped using a 5-point Likert scale where 1 represents "strongly disagree" and 5 represents "strongly agree".

The items of scale are as below:

1. "Our team members suggest new ways to achieve goals or objectives"
2. "Level of stability of the overall project context"
3. "Our team members suggest new ways to increase quality"
4. "Our team members promote and champion ideas to others"

5. "Our team members exhibit creativity when given the opportunity to them"
6. "Our team members develop adequate plans and schedules for the implementation of new ideas"
7. "Our team members have new and innovative ideas"
8. "Our team members come up with creative solutions to problems"

Table 3.6: Instruments

Variable	**Source**	**Items**
Agile Response to Change (IV)	Nguyen and Mohamed (2020)	6
Project Complexity (Med)	Nguyen and Mohamed (2020)	7
Team Creativity (Mod)	Ali, Ali, Leal-Rodríguez and Albort-Morant (2019)	8
Project Performance (DV)	Nguyen and Mohamed (2020)	6

3.6 Statistical Tool

To examine the relationship among IV and DV i.e. Agile Response to Change and Project Performance respectively, correlation and regression tools are used. SPSS version 21 is used to do both the analyses. To examine the strength and weakness among the variable's correlation analyses is used, whereas for hypothesis testing regression analysis is done.

3.7 Covariates

One-Way ANOVA test is performed to find the control variables that could influences the variables used in the study. The demographic variables are compared one by one with the dependent variable and the significance value is checked. If the value of any of the demographic is significant then we have to control it, because it may affect the result as a whole. The demographic value of p is insignificant if it is greater than 0.05 and it is significant if it is less than 0.05. In our case the demographic values (p) are insignificant and so there is no control variable.

TABLE 3.7: Covariates

Covariates	**F Value**	**Sig.**
Gender	1.404	0.237
Age	1.487	0.218
Qualification	0.706	0.619
Experience	2.382	0.061
Level	0.344	0.558

Table 3.7 depicts the outcomes of covariates. The insignificant difference exists among gender and project performance where (F=1.404, p=0.237), insignificant difference among age and project performance where (F=1.487, p=0.218), insignificant difference among qualification and project performance where (F=0.706, p=0.619), insignificant difference among experience and project performance where (F=2.382, p=0.061) and insignificant difference among level and project performance where (F=0.344, p=0.558).

3.8 Reliability Analysis of Scale

A process of getting consistent results again and again because of testing a specific item multiple number of times. It is very important to do the reliability test in a research study, to know whether the scale is reliable or not for the study. One of the widely used methods to check reliability is by through Cronbach alpha which tells the internal reliability of the variables and the link between them. The Cronbach alpha has a significant range of 0 to 1 (Cronbach, 1951). The higher the value the higher the reliability of the scale is. It is often considered that the reliability of the used scale is good if it has the value of Cronbach equal to 0.7 or above 0.7, but the value of 0.6 is also acceptable if the items in a scale are less than 10.

Table 3.8 shows the value of the Cronbach alpha for scales. Values of the three variables are above 0.7. Therefore, these scales are considered as reliable to be used in the current study for the contextual setting of Pakistan.

TABLE 3.8: Reliability Analysis

Variable	**Cronbach's Alpha**	**Items**
Agile Response to Change (IV)	0.818	6
Project Complexity (Med)	0.759	7
Team Creativity (Mod)	0.961	8
Project Performance (DV)	0.833	6

Table 3.8 depicts the values of Reliability Analysis of each variable along with the number of items used in the respective column. The accuracy of the results produced by any measuring procedure are verified by the reliability checks by using the same test twice of after some time. Cronbach Alpha Value of Agile Response to Change is 0.818, Project Complexity is 0.759, Team Creativity is 0.961, and the value of Project Performance scale is 0.833.

3.9 Data Analysis Techniques

Various steps have been performed for the analysis of data, after the data collection, which is collected using convenience sampling technique. 380 questionnaire were circulated from which 347 respondents' data were taken into consideration for data analysis.

1. The first step is to select the questionnaire which are filled appropriately by the respondents. The Online data collection made it easy to keep check on the responses you got.

2. The next step was to encode all the data collected against each variable and enter the encoded data into SPSS software.

3. Frequencies of the sample characteristics were calculated.

4. After that descriptive statistics were calculated by using numeric values.

5. Then the Reliability of the Scale was checked by calculating Cronbach Alpha.

6. Pearson Correlation Analysis was conducted to check whether there is a significant relationship exist between variable which are used in this study.

7. To determine the proposed relationship between IV and DV single linear regression test was conducted

8. Preacher and Hayes Process were used for conducting mediation and moderation to determine the existence of the role of mediator and moderator between the independent and dependent variables.

9. Through correlation and Preacher and Hayes method, the intended hypotheses were tested to check the rejection and acceptance of the proposed hypothesis.

SPSS tool was used to analyze the collected data. Correlation, regression, mediation and moderations methods were performed for the data analysis. To test the relationship between IV and DV correlation analysis was performed. To investigate the dependency between variables Regression analysis was performed.

3.10 Analytical Techniques and Tools Used

Various statistical testing techniques and methods were used in the current research study. Such as reliability, descriptive, correlation and regression anaylsis. SPSS version 21 were used to perform all the statistical tests. Cronbach's alpha was calculated to test the reliability of scale used. Preacher and Hayes Process were used for conducting mediation and moderation.

Chapter 4

Data Analysis and Discussion

The succeeding chapter consist of all the information about the results obtained with Statistical Package for Social Science (SPSS). It comprises of mean and standard deviation of the variables, correlation analysis, linear regression analysis, mediation, and moderation analysis. The results were calculated and properly explained against the calculated hypothesis. It also shows whether the hypothesis are being accepted or rejected. The whole chapter is concerned about the results generated and the performance in regards of the current study. The current study focuses on discovering the impact of agile response to changes on project performance with the mediation role of project complexity and moderating role of team creativity.

4.1 Descriptive Analysis

Descriptive statistics comprised of all the key information points about the data. It is very necessary to analyze the descriptive statistics. It is very important for the current study because the analysis of further processes includes the descriptive analysis. It consists of total number of respondents, minimum and maximum values against each variable, including the means and standard deviation of the data. Mean refers to the average of all the values representing the data whereas Standard deviations is calculated to find out the data deviation from the mean point or mean-point variance. There are total 6 columns in Table 4.1 where 1st

column is having the name of each variable, 2nd contains number of respondents i.e. N, 3rd is the minimum value, 4th is the maximum value, 5th consists of mean value and the 6th is Standard Deviation. The table contains the summary of the whole data set. Every variable was measured at 5 point Likert scale. The table highlights the significant statistics.

In **Table 4.1** the specifics of the research variables are shown, number of respondents are shown in second column, minimum and maximum values are recorded in the third and fourth column respectively. Whereas the fifth column displays the mean and sixth column represents the standard deviation of each variable.

Table 4.1: Descriptive Statistics

	N	**Minimum Value**	**Maximum Value**	**Mean**	**Standard Deviation**
AR (IV)	347	1	5	3.15	0.82
PC (Med.)	347	1	4.43	3.18	0.71
TC (Mod.)	347	1	5	3.24	1.5
PP (DV)	347	1	5	3.14	0.82

Table 4.1 depicts that the number of respondents were 347 for Agile Response to Change, Project Complexity, Project Performance and team creativity variable. All the variables (Agile Response to Change, Project Performance, Project Complexity, and Team Creativity) were measured on a 5 point Likert scale. The mean and standard deviation values show the essence of responses because these are the respondents' observations about a specific variable. The mean value of the Agile Response to Change (AR) was 3.15 and the value of standard deviation was 0.82. The mean value of Project Complexity (PC) was 3.18 and the value of standard deviation was 0.71. The mean value of Team Creativity (TC) was 3.24 and the value of standard deviation was 1.50. The mean value of Project Performance (PP) was 3.14 and the value of standard deviation was 0.82.

4.2 Correlation Analysis

Correlation analysis is generally conducted to determine the essence of the relationship among two variables. In this study, the foremost aim to carry out the correlation analysis to find out the association or correlation among agile response to change and project performance with the mediating role of project complexity and moderating role of team creativity.

It tells us that how closely the variables are associated together. It also helps to investigate the direction of two variables, whether the shift is in the same direction or in the opposite direction. Unlike regression analysis, the relationship among variables is evaluated in terms of the movement or the direction of the variables. For calculating dependences between variables, the most common method Pearson correlation analysis is used. There are two type of correlations, positive which is represented by +ve and negative which is represented by –ve, it means that there will be positive correlation if two variables are directly associated and there will be a negative correlation if two variables are inversely correlated. Pearson correlation tells about the strength and nature of the relationship, the range is from -1 to +1. If the correlation is far from 0 that means there is a strong +ve or –ve relation among variables. But if the value of correlation is 0 that means there is no relationship among variables. The Signs shows the nature of the relationship, means if there is +ve sign it shows that increase in one variable causes increase in the other variable, this relationship is referred as direct and vice versa. The **Table 4.2** shows the correlation among the variables which are being studied in the present research. The values are also representing whether the relationship is positive or negative between variables, the magnitude and nature of relationship.

Table 4.2: Correlation Analysis

Sr No.	**Variable**	**1**	**2**	**3**	**4**
1	Agile Response to Change	1			
2	Project Complexity	.405**	1		
3	Team Creativity	.704**	.382**	1	
4	Project Performance	.510**	.346**	.697**	1

*P < 0.05, **p < 0.01, ***p < .0001 N=347 **Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed). (AR = Agile Response to Change: PC = Project Complexity: TC = Team Creativity: PP = Project Performance).

Table 4.2 depicts the values of correlations for all theoretical variables. Agile response to change is positively and significantly correlated with Project Complexity (r=.405**; p < 0.05); Team Creativity is positively and significantly corrected with Agile response to change (r = . 704**; p < 0.05) and Project Complexity (r=.382**, p < 0.05): Project Performance is significantly correlated with Agile response to change (r=.510**, p < 0.05) and Project Complexity (r = . 346**; p < 0.05): and Team Creativity (r=.697**; p < 0.05).

The results for this analysis shows that all the valuables are significantly and positively correlated with one another. The results are according to our hypothesis and we will further continue with the other processes.

4.3 Regression Analysis

The correlation analysis has been performed to analyse the existence relationship between the variables, however it only shows the existence of relation among variables, but it does not tell the causal relation among variables, so there is a need to perform regression analysis.

The regression analysis is conducted to validate that the one variable is dependent on another. It illustrates the degree to which extend the one variable is dependent on another i.e. independent. Regression analysis is a powerful tool which is used to evaluate the relationship and effect of one variable on another variable. Linear regression analysis is performed between independent and depended variables. After the linear regression, mediation and moderation regression analysis is performed.

In this present study, Preacher and Hayes Hayes, 2013 method is used for linear regression and for both mediation and moderation regression analysis. Model 4 is used for mediation and Model 1 for moderation regression analysis. Regression

analysis is performed to forecast and estimate the relationship among variables. The analysis gives the assumptions for Y from X values and helps in making decisions about the dependence of one variable on another.

4.3.1 Linear Regression

Hypothesis 1: Agile Response to Change (AR) has positive and direct relationship with Project Performance (PP).

TABLE 4.3: Simple Regression

	Project Performance			
Predictor	**B**	**R2**	**t**	**Sig**
Project Performance	.509***	0.258	11.02	0.000

Table 4.3 depicts the results of our hypothesis. There is a positive and direction relationship between IV (Agile Response to Change) and DV (Project Performance), according to our hypothesis. Our results of linear regression analysis revealed the value of β coefficient = 0.509 and value of p = 0.000 which indicates that the relationship among variable is significant and positive.

R^2 represents the coefficient of determination and the value of β shows the rate of change which demonstrates that 1 unit change in agile response to change leads to 0.509 unit change in the performance of the project. The value of p = 0.000 is also significant showing that the IV and DV relation is significant. Therefore as a result of our linear regression analysis the 1st hypothesis is accepted.

To perform the test in SPSS, from navigation tab we go to analyse and select regression analysis and perform the linear regression. The linear regression test is performed by adding IV (Agile Response to Change) and DV (Project Performance). As there is no control variable so we will not add any control variable. X is used to denote IV and Y is used to denote DV whereas C shows direct relationship among the variables. Below is the pictorial view of our accepted hypothesis.

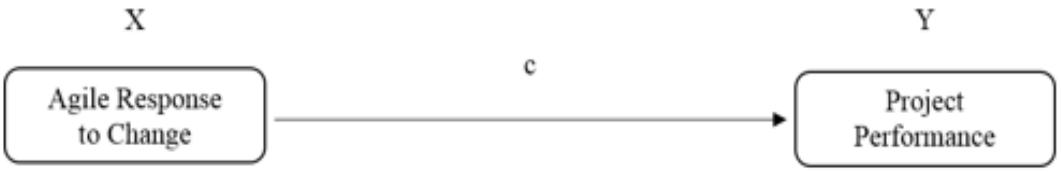

FIGURE 4.1: Effect of IV (Agile Response to Change) on DV (Project Performance)

4.4 Mediation Analysis

Mediation Analysis was performed to check the results against Hypothesis 2, which propose that the Project complexity plays a mediating role between Agile Response to Change and Project Performance. First the IV to mediator relation will be studied and then mediator to DV relation will be studied. Because mediator creates a path between IV and DV and converts direct effect into indirect effect. In order to test the mediation hypothesis Model 4 of Process macro by Preacher and Hayes was used which was used by (Hayes, 2013). In this analysis we check different paths a, b, c and c' respectively. It is very important to study mediation path from IV to M and M to DV, because if any of these paths are insignificant than there will be no mediation effect among variables. Therefore, we will be checking all the paths to see whether our theory is approved or not and the hypothesis we have developed are accepted or rejected based on the results. Following is the pictorial representation of mediation in which Project Complexity mediates the relationship between Agile Response to Change and Project Performance.

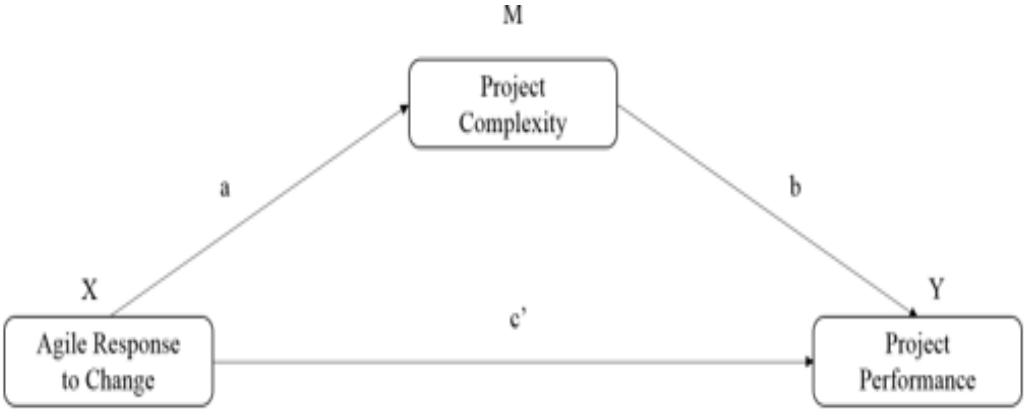

FIGURE 4.2: Mediation Analysis with coefficients

The effect of mediator i.e. Project Complexity between Agile Response to Change and Project Performance.

TABLE 4.4: Mediation Analysis

IV	**Effect of IV (a on M path)**	**Effect of M on DV (b path)**	**Total Effect of IV on DV (c path)**	**Direct Effect of IV on DV (c' path)**	**Boot-strapping Results for Indirect effect**	
	β	β	β	β	**LLCI 95% ULCL95%**	**UUCL 95%**
AR	.349**	.401**	.441**	.532**	0.0124	0.1264

Table 4.4 depicts the results for mediation analysis. IV is representing the independent variable which is agile response to change. DV is representing the dependent variable which is project performance. M is used for mediator which is project complexity. CI is representing the confidence interval.

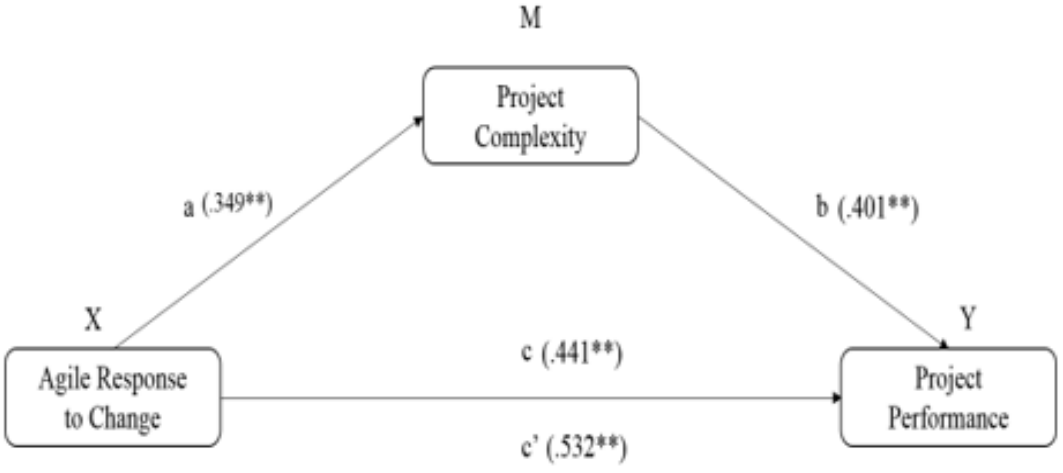

FIGURE 4.3: Mediation Analysis with paths and values

Figure 4.3 is depicting the indirect path generated as a result of using mediator between IV and DV. There are three paths a, b and c are represented in the figure. Our second hypothesis will be checked below

4.4.1 Hypothesis 2 (IV to Mediator)

In order to check our hypothesis 2, significance of IV-Mediator relationship needs to be checked using model 4, Hayes process macro is used for doing regression analysis. The value for β coefficient =.349 shows that it has a positive effect between two variables. The most important result is to be checked is P= 0.000 which is showing the significant relationship. The value of β coefficient indicates that approximately 35% variance occur in project complexity due to agile response change. The value of R2 is (.164) which indicates that IV in Mediator causes a shift of 0.164 units. Thus, it is cleared from these findings that the first prerequisite for mediation is acknowledged which is the meaningful and constructive relationship between the IV and Mediator.

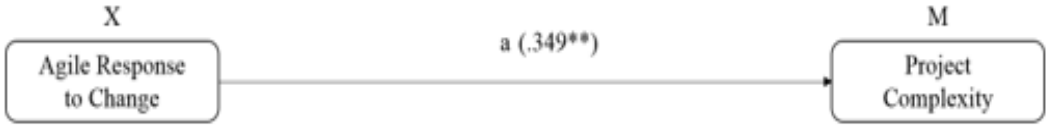

FIGURE 4.4: Effect of IV on Mediator with path and value

4.4.2 Mediator to DV

The second condition for acknowledging mediation is to test the essence of the Mediator-DV relationship. All the results are shown in the table, we have to test the relationship against the results. For mediation review, the value of effect of M on DV is written in third column of the table.

As the results from the table depicts that the value of β coefficient = 0.441 showing a positive relationship. The value of p = 0.000 showing a significant relationship. At this moment, we are testing path b that whether this relationship is important or not and what sort of impact it creates.

The value of β coefficient indicates that approximately 44% variance occur in project performance due to project complexity. The value of R^2 is .120. This value means that 1 unit increase in Mediator value induces a change in DV value of .120 unit. So, the value of β is positive according to our hypothesis condition

and the value of p = 0.000 which is the significant value. This result shows that path b is important and can be forwarded to check the results for further processes.

Following is the pictorial representation of Mediator to DV relationship. The **figure 4.5** shows the path b and its value.

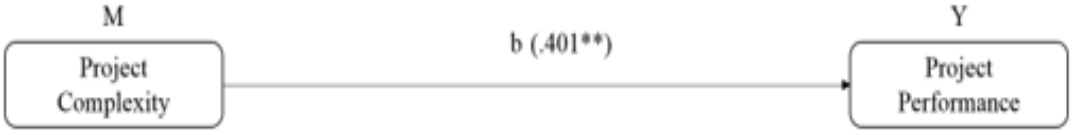

FIGURE 4.5: Effect of Mediator on DV with path and value

As we have stated earlier in our hypothesis that the project complexity mediates the relationship between agile response to change IV and Project Performance DV. Now we have the results of indirect path "a" and "b". The results indicates that the paths "a" and "b" are important and have a significant positive effect. Thus, we have to look at the final of mediation now.

All the results are shown in the Mediation Analysis Table 4.4. Now we will have a look at the indirect effect of X and Y which is IV and DV for mediation. The indirect effect identifies that the mediator is present between IV and DV, as mediator eliminates the direct affect between IV and DV and communicates indirectly between IV and DV. By running model 4 values of indirect effect of X and Y are obtained, we will have a look on LLCI i.e. lower limit confidence and ULCI i.e. upper limit confidence index.

It will help us to verify if the two limits are having zero between them or not. If there is zero between the thresholds that means is no mediation, for instance the value of LLCI is 0.1 and UULCI is -0.1 or vice versa, it means that there is no mediation. But, if the value of LLCI and ULCI are in the same direction which means both are having positive or negative values then there is no void and the mediation is agreed. So, when we are looking at our results we can see that LLCI 95% has the value of .0124 and ULCI95% has the value of .1264

Both the values are with same sign representing that there is no zero between them, Hence our Hypothesis 2 is accepted which is project complexity mediates the relationship between agile response to change and project performance.

4.5 Moderation Analysis

To determine whether the relationship between agile response to change and project performance depends on task creativity, moderation analysis is performed. To test our last hypothesis which states that the Team creativity moderates the relationship between agile response to change and project performance, we have used the Process macro model through SPSS (Hayes, 2013).

TABLE 4.5: Moderating Effect of Team Creativity

	B	**se**	**t**	**p**	**LLCI 95%**	**UUCL 95%**
Boot Strap Results for Indirect Effect						
Int. Term	0.1132	0.0315	3.5922	0.0004	0.0512	0.1752

The table shows that the moderation hypothesis is accepted and its does strengthen the relation between agile response to change and project performance. As we check the value of interaction term in the table that value of β = .1132 which shows a positivity in relation. The value of P = .0004 which is also significant. For moderation effect we check the LLCI and ULCI value that if it contains zero between both the limits or not. The value for LL95%CI = .0512 and the value for UL95%CI =.1752, which shows that there is no zero between both the limits. So, from these results we can conclude that there is a moderation effect. So Hypothesis 3 is accepted that there is moderation between IV and DV.

4.6 Summary of Hypothesis

Table 4.6 represents the summary of results for the proposed hypothesis.

TABLE 4.6: Summary Of Hypothesis

Sr. No.	Hypothesis Statement	Results
H1	There is a positive relationship between agile response to change and project performance.	**Accepted**
H2	Project complexity plays a mediating role between agile response to change and project performance.	**Accepted**
H3	Team creativity moderates the relationship between Agile Response to Change and Project performance; such that if team creativity is high then the relationship between agile response to change and project performance would be strengthened.	**Accepted**

Chapter 5

Discussion and Conclusion

The succeeding chapter comprises of detailed discussions of the hypothesis produced in light of theory and their reasoning of acceptance and rejection, empirical evidence, interpretation of findings and also discusses the limitations of the study, future research directions and conclusion. The chapter is split down into 2 different parts. The first part discusses the findings and hypothesis results, the consequences for the theory and practitioners and the last part discusses the limitations of the study and future research directions. This chapter gives an outline of our findings.

5.1 Discussion

The core emphasis of the present research study was to investigate the relationship among agile response to change and project performance in project bases organizations of software/IT industry within the contextual settings of Pakistan. The research study also explored the mediating influence of project complexity between agile response to change and project performance. The conceptual model study explored the moderating effect of team creativity on agile response to change and project performance in project-based organizations from software/IT industry working in major cities of Pakistan i.e. Lahore, Rawalpindi and Islamabad. On the basis of which we hypothesized unique relationships among research variables, conceptual framework was developed. The present study serves the evidence from

the development sector of Pakistan and the research findings can be used for effectiveness in the field of the project management by the project managers. The present study established three hypothesis, and each of the hypothesis is backed and supported by the results from data and theory.

The results of our present study shows that agile response to change has a positive effect on the performance of the project, which exhibits that the use of agile methods plays a significant role in enhancing the performance of the projects. The study also shows that the project complexity mediates the relationship between agile response to change and project performance and team creativity plays a significant moderating role between agile response to change and project performance. All the hypothesis are discussed in detail as below:

5.1.1 Hypothesis 1: There is a Positive Relationship between Agile Response to Change and Project Performance

The results of our 1st hypothesis of the study are well supported through data collection and analysis and indicates that there is a significant relationship between Agile Response to Change and Project Performance. As it was hypothesized that Agile Response to Change will positively related to Project Performance, means the use of agile approaches in a project such as the ability to response quickly towards change have a vital effect on the overall performance of the project, results in improving the project performance. Our 1st hypothesis results which is β= 0.509, t = 11.020 p = 0.000 proved the existence of positive relationship between agile response to change and project performance. The value of t = 11.020 indicates the significant level of relationship among agile response to change and project performance, as the t value is greater than 2 refers that the results are statistically significant. The value of β coefficient= 0.509 is demonstrating that if there is 1% unit change in agile response to change than there are 50.9% units chances of performance to be improved of a project.

The results of the current study are lined with Nguyen & Mohamed (2020) and have found significant and positive relationship among agile response to change

and project performance, which means that the ability or capacity of project management teams to respond to change which could be external or internal may help to prevent or reduce schedule delays and cost overrun, in turn improve the performance of the project. Serrador and Pinto (2015), also found positive association between agile approaches and project performance referred as project success. According to him, the higher the agile methods used in the project, the higher the project performance will be reported. Another researcher Budzier and Flyvbjerg (2013), who studied a data set of IT projects have found that the use of agile methods improve the project schedule.

In a project environment many factors contributes to success and failure of software/IT projects. Truong and Jitbaipoon (2016) argues that the use of agile methodologies in a project allow teams to quickly adapt to unpredictable and rapidly changing requirements which exists in most of the software development projects/IT projects. Furthermore Truong and Jitbaipoon (2016), found that the collaborative attitude of a project team, effective and adaptive strategy to respond promptly to the changes, and effective communication skills enhance the success of software development projects/IT projects. The current study only proves the positive relationship among agile response to change and project performance but the detailed aspects of the agile approaches and methodologies are not identified. Therefore, in future this can be viewed as a limitation of the study and future researchers can address it to identify the detailed aspects of agile approaches and methodologies that can enhance the performance of software projects/IT projects in Pakistan.

5.1.2 Hypothesis 2: Project Complexity Plays a Mediating Role between Agile Response to Change and Project Performance

It was proposed in our 2nd hypothesis that project complexity plays a mediating role between agile response to change and project performance. The hypothesis has been accepted and the result demonstrates the significant relationship of project complexity as a mediator between agile response to change and project

performance. As the value of lower limit = 0.0124 and upper limit 0.1264 is indicating that the unstandardized regression coefficient are both positive and there is no existence of zero in the bootstrapped 95% interval around the indirect effect of relationship of agile response to changes and project performance through project complexity.

The results provide evidence about intervening of project complexity among agile response to change and project performance. The relationship of agile response to change and project performance was positive and project complexity mediates between agile response to change and project performance. The findings of the current study are consistent with the previous results showing that project complexity acts as a mediator and interferes in the relationship among certain independent and dependent variables (Riaz, 2017). According to Vidal and Marle (2008), in general, complexity in a project have a negative influence on the overall performance of the project but on the other hand it also have a positive influence on project results/outcomes (as a result of emerging properties which can create new opportunities for a project. Ruoslahti (2020) stated that complexity is considered as one of the positive aspect in projects. It is a source of opportunity therefore the important thing is to properly manage project complexity in order to take maximum advantage of the opportunity created (Kermanshachi et al., 2016).

Project complexity is also a source of interaction among people, project aspects and technological factors which in a long run increases the team collaboration, knowledge sharing behavior, problem solving attitude and creative thinking among project teams (Wood & Ashton, 2010). Complexity in a project provide insights to generate new ideas, to share the knowledge and to enhance the creative thing among teams in order to improve the performance of the project. Complex situations and uncertain environments are the source of evolving thinking patterns and make the project team capable of leaving their comfort zones. Bjorvatn and Wald (2018) argued that project complexity one of the potential and important determinants of project management performance. Agile approaches are widely used in project based organizations to manage project complexities in a positive way in order to take maximum advantage of emerging opportunities which leads towards a successful completion of a project and ultimately improves the project

performance. So we concluded that project complexity mediates the relationship between agile response to change and project performance.

5.1.3 Hypothesis 3: Team Creativity Moderates the Relationship between Agile Response to Change and Project Performance; such that if Team Creativity is high then the Relationship between Agile Response to Change and Project Performance would be Strengthened

The 3rd Hypothesis of our study states that team creativity moderates the relationship among agile response to change and project performance, in such a way that it strengthens the relationship among agile response to change and project performance. The findings of our 3rd hypothesis showed significant results. The results are indicating that there is a significant effect of team creativity (β coefficient = 0.1132, t = 3.599, p = 0.0004). The value of β coefficient = 0.1132 is bringing the noticeable change in the relationship of agile response to change and project performance. The value of t = 3.599 indicates that the relationship is significant. The value of lower limit = 0.0512 and upper limit 0.1752 is indicating that the unstandardized regression coefficient are both positive and there is no existence of zero in the bootstrapped 95% interval, which means that the results are statistically significant and the hypothesis is accepted.

According to the results of the hypothesis team creativity moderates the relationship among agile response to change and project performance. In this current study the signs of the moderating impact of team creativity suggests that the domain specific knowledge must be shared among team members to incorporate skills and competencies at the project level. High creativity among team members allow project team to be responsive towards internal and external changes in a project through collaboration and knowledge sharing with others and to devote their energies and efforts to successfully complete the project by improving the overall project performance.

There is no research existing previously to study moderating effect of team creativity in the domain of project management. However, findings of the previous research studies conducted by Bouncken (2009); Kirton (1989); Maier, Hülsheger, and Anderson (2015), Rego et al., (2007) stated that team creativity is considered as one of the important factor and has positive influences on performance of the project. There could be many reasons for the acceptance of the hypothesis. The impact of creativity as a moderator can be viewed from fast researches which are partially or fully in support of the positive impact of creativity as a moderator (Janssen et al., 2004).

While relating the findings of this study with the cultural context of Pakistan, the current study is very important in order to illuminate the fact that the software/IT industry in Pakistan is evolving and promotes the creative ideas and thinking of team members while solving problems and generating new products. Although there is a large gap exists between project managers and project team members while taking decisions but still there are various projects operating in software/IT industry in Pakistan to incorporate creativity and collaborate with each team member to successfully complete the projects. The future research can be recommended in the contextual settings of Pakistan to study the relationship of task creativity or project manager's creativity.

5.2 Limitations of the Research

In a research study limitations cannot be avoided, therefore, every research has its own limitations. The present research study is also bounded in limitations, because it is not possible to cover all the aspects in one study. By incorporating some well-informed empirical evidences in the literature, the present study has filled few of the research gaps. Whereas on the other hand, there are some other limitations associated with the present study due to time and resource constrains. Due to the pandemic, current market and economic conditions, data gathering from various project-bases organizations is complicated, therefore, I could not reach out to them in person and explain the purpose and the context of the questionnaire, so there are chances that some people might fill data randomly. It is very hard and

complicated to acquire the real time data using online resources such as Google Doc. There were 380 questionnaire circulated and 347 were useful for the analysis of the results.

Though the study empirically examines the relationship between agile response to change and project performance, but the spectrum of the current study is subtly restricted and more aspects of agile approached cannot be analyzed at once, which can also be explored in the research. Therefore this can be a limitation of the study and future researchers should investigate it by exploring different aspects of agile methodologies in the projects, in the contextual settings of Pakistan. Due to the limited time and resources, the research was limited to the project based organization of software/IT sector of Pakistan alone and more sectors could not be considered/chosen. Therefore cross-industry and inter-industry analyses of agile response to change and its impact on project performance can be explored with other connected variables in future researches. Also, the same model can be applied to conduct the research on other sectors such as construction industry, telecommunication, etc.

Another limitation of the presentation study is the use of marginally small sample size due to time and resource constrains. The study sample has significant effect on the findings and outcomes of the research. Also the non-accessibility of resources in other cities also affects the sample size. Future researchers may choose a large sample size to test the model in order to be more generalized.

The study is only conducted by using one mediator and one moderator among the independent and dependent variables. However future researchers can also use other moderators such as team member skills and expertise, team member competences, team member technical skills etc. Furthermore, this study has yet another limitation. We have used the convenience sampling technique. It is commonly used to obtain the data in a short time from a wide number of individuals, so we have choose the sample which was easily accessible in the pandemic, but it restricts the generalizability. The data was obtained only once and it is collected by using cross-sectional design survey questionnaire. So, the present research study would not be able to provide clear causality between agile response to change and project performance. In particulars, we have only investigated the employees working in

the software/IT sector of Pakistan, so there is a lot of margin to explore other sectors as well. Additionally, the research study was carried out in the cities (Lahore, Rawalpindi and Islamabad) of Pakistan.

5.3 Future Research Directions

There is always a capacity and chance for improvement in any research study. The present research study opens various novel and unique paths for future researchers, several factors can be further studied. In this study we explored the impact of agile response to change on project performance but future researchers can explore the impact of other agile methodologies such as Scrum on project performance or overall project success in the same domain.

Additionally, the current study only focuses on project based organization of Software/IT industry only, so it provides a way forward to other researchers to use and replicate the current model in other sectors such as construction industry, real estate, or telecomm etc. Also this model can be used to conduct the research study for traditional or non-project based organizations (both public and private). The current study is conducted on software industry of Pakistan, future researchers may examine the same model in different cultures around the world considering the same industry or other sectors such as construction, real estate, telecomm, or education. So the research can be simulated on different cultural context in future because each country has its own culture so that will help in forecasting whether the results are same for other cultures or not.

Moreover, the relationship among agile response to change and project performance can also investigated by using other mediating variables. Also, the role of other moderating variables can be studied between the relationship agile response to change and project performance by future researchers. Along with this multiple factors affecting such relationship could also be investigated. Furthermore, we recommend to focus more on data collection and data collection techniques for future research. The future research study would be longitudinal. Consequently, this research study can be improved further and developed by following multiple potential research orders.

5.4 Conclusion

The aim of the current study was to empirically examine the relationship between agile response to change and performance of the project. As we all know, today's modern environment is dynamic and change is inevitable, therefore the research study has made an attempt to expose the significance and influence of agile response to change on project performance in project based organizations of software industry in Pakistan.

This study was conducted by incorporating the fact that the project management is growing its roots in Pakistan especially in software industry, it has been observed that a huge number of national and international projects are done by software/IT industry nationwide in the past decade.

Additionally, the model is tested by adding mediating role of project complexity between the relationship of agile response to change and project performance. Furthermore the study examined the role of team creativity as a moderator between agile response to change and project performance. The data was collected from project-based organizations of software companies operating in Pakistan (Lahore, Islamabad and Rawalpindi) by using an online survey and tried to find the empirical evidence of agile response to change on project performance.

In the software industry project managers plays a very crucial role and are responsible for delivering the expected outcomes on time and other constrains. This research study will help project managers to improve responsiveness towards change and how to deal with complexities in order to moderate its negative which ultimately leads to improve the project performance. It is also very important to explore the different aspects of agile methodologies that effects the performance of the project, which can be taken into consideration by future researchers regarding the specific industry. Pakistan's society is very collectivistic and the project managers tend to avoid focusing on the changes and project complexities and are more focused on completing the deliverables and projects with effect the project performance and ultimately leads to project failure. Hence it can be said that this research study provides a practices and procedures that the project managers can follow to improve the performance of the projects.

380 questionnaires were distributed in total, however only 347 were used for the data analysis as these the information in these questionnaires was complete and most appropriate required for carrying out the analysis of the study. The statistical tests indicates that the reliability and the validity of the variables used in the model and fit of the model was suitable. The research study was comprised of three hypothesis which are supported through complexity theory.

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Appendix-A

Questionnaire

Dear Respondent

My name is Maria Maqsood. I am a student of MS Project Management at Capital University of Science and Technology (CUST), Islamabad. I am collecting data for my research study titled as "**Impact on Agile Response to Change on Project Performance with the mediating role of Project Complexity and moderating role of Team Creativity**". It will take your 10-15 minutes to answer the questions and to provide valuable information. I assure you that data will be kept confidential and will only be used for academic purposes. Thank you for your help and support. Your active contribution is the real strength of this research study!

Sincerely,

Maria Maqsood,

MS Research Scholar,

Faculty of Management and Social Sciences,

Capital University Science and Technology, Islamabad.

Section 1: Demographics

Gender	1- Male 2- Female
Age(years)	1 (18-25), 2 (26-35), 3 (36-45), 4 (46-55), 5 (above 55)
Qualification	1 (Undergraduate), 2 (Graduate), 3 (Masters), 4 (Mphil/MS) 5 (PhD), 6 (Other)
Experience(years)	1 (1 and less), 2 (6–10), 3 (11-15), 4 (15-20), 5 (20-above)
Level	1 (Project Manager), 2 (Project Team Member)

Section 2: Agile Response to Change

Please tick the relevant choices: 1= strongly disagree, 2= Disagree, 3 = Neutral, 4= Agree, 5= Strongly Agree.

From your experience in your selected project, to what extent do you agree with each of the statements below?

Section 3: Project Complexity

Please tick the relevant choices: Compared to your average projects, please select for each listed factor, the descriptor that best reflects your selected complex project

1	Project management team had the abilities to respond to political changes that affected the project	1	2	3	4	5
2	Project management team had the abilities to respond to economic changes that affected the project	1	2	3	4	5
3	Project management team had the abilities to respond to policy changes that affected the project	1	2	3	4	5

4	Project management team had the abilities to respond to social value changes (e.g. awareness of environmental issues, safety standard and climate change) that affected the project	1	2	3	4	5
5	Project management team had the abilities to respond to technology changes that affected the project	1	2	3	4	5
6	Project management team had the abilities to respond to rapidly changing tasks in the project	1	2	3	4	5

Section 4: Project Performance

Please tick the relevant choices: 1= strongly disagree, 2= Disagree, 3 = Neutral, 4= Agree, 5= Strongly Agree.

From your experience in your selected project, to what extent do you agree with each of the statements below?

Section 5: Project Complexity

Compared to your average projects, please select for each listed factor, the descriptor that best reflects your selected complex project.

	Project Performance Indicators	**Rating Scale**				
1	Extent to which the project was	Significantly	Slightly	On	Slightly	Significantly
	delivered on schedule	under	under	schedule	Over	Over
2	Extent to which the project was	Significantly	Slightly	On	Slightly	Significantly
	delivered on budget	under	under	budget	Over	Over
3	Extent to which the project scope expectations were met	Significantly	Slightly	Achieved expectations	Slightly	Significantly
		under	under		Over	Over
4	Extent to which the project's	Significantly	Slightly	Achieved expectations	Slightly	Significantly
	quality objectives were met	below expectations	below expectations		above expectations	above expectations
5	Extent to which my organization	Significantly	Slightly	Achieved expectations	Slightly	Significantly
	achieved its desired project outcomes	below expectations	below expectations		above expectations	above expectations
6	Number of project stakeholders that achieved their desired project outcomes	No stakeholders	A few stakeholders	Some stakeholders	Most stakeholders	All stakeholder

	Project Complexity Factors	**Rating Scale**				
1	Number of different organizations involved in the project	Very low	Moderately low	Similar number	Moderately high	Very high
2	Number of distinct disciplines, methods, or approaches involved in project execution	Very low	Moderately low	Similar number	Moderately high	Very high
3	Level of stakeholder agreement about the project outcomes	Very low	Moderately low	Similar level	Moderately high	Very high
4	Level of importance of legal, social, or environmental implications on project execution	Very low	Moderately low	Similar level	Moderately high	Very high
5	Overall financial impact (positive or negative) on the projects and stakeholders	Very low	Moderately low	Similar impact	Moderately high	Very high
6	Level of importance of the project to my organization	Very low	Moderately low	Similar level	Moderately high	Very high
7	Level of stability of the overall project context	Very low	Moderately low	Similar level	Moderately high	Very high