Impact of Agile Methodology Use on Project Success, Mediating Role of Project Complexity And Moderating Role of Managerial Support

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MPM161007

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DEPARTMENT OF MANAGEMENT SCIENCES

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This is to certify that Mr. Asim Riaz has incorporated all observations, suggestions and comments made by the external evaluators as well as the internal examiners and thesis supervisor. The title of his Thesis is: Impact of Agile Methodology Use on Project Success, Mediating role of Project Complexity and Moderating role of Managerial Support.

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Adv. Humaira Riaz, brother **Dr. Qasim Riaz.**

(Asim Riaz)

I Would Like To Dedicate This Work To My Parents & My Siblings.

Abstract

This research is conducted to analyze the impact of Agile methodology usage on Project success along with Project complexity acting as a mediator and Managerial support acting as a moderator in the study.This research was particularly carried out to investigate the agile mechanism implementation and usage which was usually followed in software industry so the data was collected from software project industries running in Pakistan. Results show that Agile methodology usage significantly impacts the success of projects and Project complexity acts on as a mediator in the relationship moreover Managerial support is approved to act as a mediator in the described relationship. It has been concluded from the proposed study that complexity has a negative relation with the project success but in case of agile methodology implementation, managerial support is used as a catalyst to overcome the complexity in order to achieve the desired success of the project.

Keyword: Agile methodology use, Project complexity, Managerial support, Project success

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CHAPTER 1

INTRODUCTION

1.1.Background

The most emerging trend in the software firms is the use of agile methodology to conduct development of the software projects. This word was first time used in history in 2001 (Beck et al. 2001).It is something totally different from the traditional project management approaches, This word was coined as the evolutionary project management technique (Gilb, 2007).Many of the software development project companies are moving toward the use of agile methodologies usage to conduct their software projects because it is the most effective way and most efficient way and technique to collaborate with the customers. There are still many of the software projects which fail because there are many hidden aspects which still need to be identified. There are many aspects which lead to the success of the project as teamwork showed that project success is based on the concept of learning, work satisfaction and effective positive approaches. Traditional teams are performing well but the agile teams are leading the project with quality and success (Lindsjorn et al. 2016).

Most of the software companies are moving toward using agile methods but the rate of IT projects failure is still high because most of the agile unhidden aspects still need to be explored. The use of agile methodologies and practices showed a very effective and improved quality of projects specially the software development side of the projects, the use of agile methodologies allows and supports the project managers to improve the lacks of the project by reviewing it again & again during the project. It supports in terms of focusing on the main goal and need of the project (Maruping, Venkatesh, &Agarwal,

2009).It is much important to track the requirements of the customers in order to deliver the appropriate and right quality of items for future projects and project success.

Checking up the taste of the customer is highly dependent on the success of project, agile methodology use plays an important role in projects quality which includes the stability, functionality and the reliability of the data collected from developers (Tsai, Ho, Chang, & Jiang, 2016). Agile methodology is fast growing and focusing the internet software industry specially the application environment, and the new agile methods are implemented, which needs to be discussed currently (Abrahamsson, Salo, Ronkainen&Warsta, 2002).This shows that agile methodology still needs empirical evidence in many aspects. In many of the previous researches agile methodology was found to have great influence on the success of the project. Agile scaling method defines the path that are required for the different challenges which are faced by the developers, in this way our study use agile methodologiesto achieve project success (Ambler, 2009).

Projects have their own specifications and complexities which need to be lessen to execute the kind of project required by the customers. By working on the causes which cause project complexity increases the chances of success of the project (Gidado, 1996).One of the method to reduce the complexity of the project is to use agile methods because they show one to one collaboration with the customers. Complexities in the software development projects are handled by using agile techniques (Mishra & Mishra, 2011). Still there is a need to study how project complexity impacts the success of the project and how the complexity of the project can be reduced.

The success of the project doesn't solely depends on the methodology that we have used, it also depends on many other factors as well including the project manager support. Project management methodology and project success are based on the same line and the

directions as provided by the project manger (Joslin& Müller, 2015).The basic thing in information system development is to exploit and gain benefit from the top managers to successfully implement the management information systems (Jarvenpaa& Ives, 1991).

If the projects are complex we need top management support to deal with the project complexity that is why we have used managerial support as moderator in our model.

1.2.Gap Analysis

Agile project methodology is emerging trend among the project methodologies and techniques many of the topics still need some empirical evidence in a latest study conducted by Serrador and Pinto (2015) the impact of agile methodology use was studied on the project success including how planning impacts the agile methodology. Few studies have found the complexity in organizations there is still a need of evidence to highlight the impact of project complexity in organizations using agile methodology.Larman (2004) states that many of the agile methodology techniques and approaches have many more outcomes which need further research.

Most of the organizations are still using traditional project management approaches and some are using mixed methodologies i.e. hybrid methodologies and few are moving toward agile methodology use approach. Those using agile methodology approaches are evidencing high success rate yet and are attracting the other sectors as well to move toward agile methodology usage. As according to agile governance theory there are so many untouched areas considerednecessary to explore for the agile success (Luna, Kruchten, & de Moura, 2015).

Agile practices are not being just followed by IT professionals but it is also being used in many other fields of business and accountings and still need to connect with the project

management methodologies linked to agile methodologies as recently (Anderson et al. 2005) illustrated the link between traditional and agile methodologies.. Because there is no perfect methodology (Schwaber, 2006) for further investigation in this particular area.

Projects have their own specifications and complexities which need to be lessen to execute the kind of project required by the customers. By working on the causes which cause project complexity increases the chances of success of the project (Gidado, 1996).One of the method to reduce the complexity of the project is to use agile methods because they show one to one collaboration with the customers and it was recommended for the future research that there is still need to study that how project complexity impacts the success of the project.

There is need to search for those empirically, there is no such research found in extent literatureproviding evidence on the role of management support between agile methodology use and project success. Previously it is studied among organizations other than project based organizations using agile methodology use. So this study will show how management support impacts the relationship of agile methodology use on the success of the project.

1.3.Problem Statement

Agile success is an important aspect of project management; it addresses and gives a new and effective direction to all those failed methodologies and practices traditionally followed for the project success. Still there is a question mark that which projects mostly succeed the one following the traditional methods or the one following the latest agile methodology. Many consider the agile methodologies to be the best to be followed but what lacks is the empirical evidence to this approach and many unhidden aspect related the methodology. The current study focuses on project manager to adopt the agile

methodology for fruitful outcomes. The aim of the study is to find out agile methodology impact on project success which is highly ignored and less explored area in the current literature, secondly also aim to check the mediated mechanism of project complexity, along the rapid exploration of this topic the studies generally ignore how agile methodology usage is influenced by the complexity of the project, finally the study also aim to solve the problem in the current literature to check the moderating role of manager support between project complexity and project success.

1.4.Research Question

On the basis of stated problems, the present study is intended to find answers for some questions, brief summary of the questions are as follows:

Question 1:How agile methodology usage impacts the success of the project?

Question 2:Does project complexity mediates between agile methodology usage and project success?

Question 3: Does management support play a role of moderator between the relationship of project complexity and project success?

1.5.Research Objective

Generally objective of the study is to develop and test projected model to explore the relationship between agile methodology, project complexity and success of agile projects. The Management support is further considered as the possible moderator for the relationship of the mentioned variables in the research model (agile methodology use, project complexity, agile success).

The precise objectives of the study are stated below:

1. To explore the relationship between role of information system development complexity and agile methodology usage.
2. To explore the mediating role of project complexity between agile methodology use and success of the software development projects.
3. To examine the moderating effect of management support on the relationship of project complexity and success of the project.

1.6.Significance Of The Study

This study will not only help the practioners of the project industry but it will also provide empirical evidence related to the use of agile methodology. It will give a new sight to the practioners of the industry that is it really important to use agile methodology for the successful completion of the project and how it effects the customers of the industry as agile methodology provides one to one evidence on perfect collaboration with the customers. It will provide answer to the questions that which are those important aspects of agile methodology that the traditional project management approaches should be given less important over the emerging agile methodology usage. Why the project industry should use agile approaches to move toward achieving success in the industry.

Along high-lightening the impact of agile methodology usage it will help project managers to understand about what is their role in successful implementation of the agile methodology and how they can support their subordinates and the project team to influence the success of the project by improvising these methods. This research will help understand the project industry the underlying aspects of the agile methodology usage and how management support can help understand the project and reduce the complexity of the project.

This study will give a new direction toward agile project management by investigating the buried aspects and ways to do and conduct a project successfully. It would be worldwide beneficial research because most of the traditional approaches are now being considered outdated and many of the projects have failed these days and the failure rate of IT projects is more than the other infrastructure and development projects (Yeo, 2002). Most of the Pakistani projects have failed or they face cost overrun therefore to investigate the underlying cause is very important objective of this study.

This research will also provide evidence on how complexity of the project affects the agile methodology usage and what is the impact of reduction of complexity on the success of the project. Because the emerging IT projects are far more complex than the traditional projects. It will help project manager's to understand the importance of reduction of the complexity of the projects in order to achieve long term success in the industry

It will help the emerging project management professionals who are working in project industry of Pakistan and who want to start the new projects in the country because the researches which are conducted outside Pakistan differ in contextual aspects and economic conditions as compared to our country we need more solid solutions toward the project industry to improve our economic conditions.Therefore, history shows that most of the projects in Pakistan happen to face cost overrun, schedule delays and poor quality or shutdown of the projects so this study will help provide the systems and methods which could cover and improve all these problems of the industry

1.7.Supporting Theory

Several underpinning theories support the model of this research paper like agile governance theory, agile theory of general relativity, theory of constraints,Archives.

Theory of coordination in agile software projects, Chaos theory in software projects and game theory. The best fit to this research model is game theory which covers all the variables studied in this research paper.

1.7.1. Game Theory

Game theory is generally related to the cooperation and interaction of the different items this theory was presented by (Neumann, 1928).Game theory is mainly used in human interactions, human behavior, economics, political science, and psychology, as well as logic, computer science and biology (Myerson, 1991).Agile methodology use, is also related to timely collaboration with the customers, if interaction with the customers is timely it would lead to the success of the project. If there would be management support and the developers will collaborate with each other they would result in significant development of the project by using agile methodology. Game theory provides tools to meet the complex interactions and to respond to the customers.

From many years agile methodology is being used to understand the complex situations agile methodology is being applied in telecommunication network from past few years. It helps to understand the independent adaptations and complex scenarios (Srivastava et al. 2005).

Problems of the networks are solved by game theoretical approach power control,cooperation and channel access Min (2008) with the help of continues collaboration and power control which can be achieved by the management support can lead to the success of the project especially in the software development projects.

Mostly the software projects are bounded by complex software networking and communication with the customers this complex networking is met by using game theory

as the game theory works on collaboration it can be any way round through sharing (Andrews &Dinitz, 2009).So this theory covers all the aspects connecting agile methodology use with the success of project relating how collaboration and management support can help in achieving the success of the project by reducing the complexity of the projects.

CHAPTER 2

LITERATURE REVIEW

2.1. Agile Methodology Usage And Project Success

More than 30 years are passed on the research of the software development projects but the recent years showed that agile methodology of software development is a key, ruling and dominant methodology which is being used and came out to be a success in performing excellence of the project (Stankovic, Nikolic, Djordjevic& Cao, 2013).

Studies showed that there is a gap where data analysis and work should be done with the concept of use of development agility and the factors and conditions which are linked with the project success. During the analysis and collecting of information it was indicated that organizational culture and empowerment of the project team is the back bone to project success (Sheffield &Lemétayer, 2013). Industry is moving toward the agile methods because the nature of the project industry is moving towards more customer focused, there is a possibility of well structured problems which are having clear objectives which are to be solved but there comes a problem with uncertain user requirements (Avison& Taylor, 1997).

Agile methods were evolved to cover the risks involved in the projects and respond to changes in the market so this leads to the success of the project. Similarly measurable tests are required to analyze the successful production of the agile software development projects (Beck, 2000). Likewise it was identified that managers become informative about a particular aspect related to the project so that you could make more informed decisions as it is found that processes, systems and people are correlated with each other for successful implementation of the project (D. Phillips, 1998).

According to Serrador& Pinto (2015) agile methodology is being widely used in the software development industry and other industries as well because it is a shift and a counter alternative to the traditional project management approaches like waterfall which are required for the successful implementation of the complex projects so by these facts it is found that agile methodology usage leads to the success of the project.

It is very important technique in the industry which is directly related to the variations in the market because it's the only method of project management in which we collaborate with the customers at each iteration so that we could share information. Organizations should carefully recognize the need to implement the agile methodology (Nerur, Mahapatra&Mangalaraj, 2005). As most of the software development projects are highly customer focused and responsive, agile method is the collective approach to produce beneficial results by interacting with the customers and agile team and modifying the plan according to those customers demand (Highsmith, 2003).

Agile methods also help to review the codes of software development projects (Beck, 2000). Code reviews serve the purpose of successfully employing the agile methodology through communication related to the software being developed. Agile methods not only focus on the excessive interaction with the customers they also help to identify the goals needed to achieve success in projects. The iterative behavior of the agile methodology technique helps to collaborate with the customers at each step so that we could remain in constant touch with the requirements of the customers (Mann & Maurer, 2005).

Counter arguments suggest that when teams are working in large parallel teams then it becomes impossible to apply one of the agile methodology i.e. scrum. Most of such projects fail so in such mega projects most of the time traditional project management approaches are considerd. On the other hand it's found to be very successful technique in

small agile practices (Paasivaara, Lassenius & Heikkilä, 2012). Similarly it is narrated that it is not a very easy task to implement the agile methodology in agile software projects. Execution of the agile methodology in the organization should be carefully implemented along with the mixture of traditional project management method for succession of the projects (Boehm, 2002).

Moreover agile methodology can be implemented in other industries as well. Because of the innovative and complex nature of the projects they should not be executed by the old traditional agile methodology processes because they are outdated for the success of the projects. So opportunities should be analyzed in the industry to implement the agile methodology technique for successful delivery of the project (Conforto et al. 2014).

Agile methodology helps to satisfy the team, customers and the overall stakeholders of the project industry. This methodology helps to improve the delivery time to launch the projects but they are not directly linked to the success of the projects (Budzier & Flyvbjerg, 2013).Whether if the project industry fails to identify those methods which are required to understand the agile methodology usage the project certainly fails (McAvoy & Butler, 2009).Another view suggests that there is not much difference between the use of agile methodology and the organizations which use traditional project management approaches. The success rate and the time of delivery to implement the projects is not much different setting because the failure rate in both cases is not well differentiated (Magazinius & Feldt, 2011).

Literature deny the list of association of agile methodology use with project success or build an argument that due to mixed results in the precious literature we want to experimentally list this relationship in the current context etc. (Coram & Bohner, 2005)

There is difference of opinion highlighted in the literature previously found so in this paper we will analyze agile methodology is successful in software industry. So from the above literature we can propose that

H1: Agile methodology usage is positively and significantly associated with project success.

2.2. Agile Methodology Usage And Project Complexity

A systematic evaluation of complexity drivers and their subsequent demand placed on the resources of the organization for each activity of the project needs to be conducted, for this purpose a novel approach based on a resource-oriented process cost calculation method has been developed. The approach includes a consideration of uncertainties regarding the complexity impact and definition of a capacity to tolerate complexity, Schuh et al. (2017).

Project Complexity is directly associated to the success and failure of any project and it is increased in case of not proper handling the project performances and the executions of the task distributed or the tasks which will be implemented in near future. The project complexity varies in different terms that can the technical complexity or the management complexity; it includes the number of technologies involved and the familiarity of team with technologies or it can be technical interfaces, and in management complexity the project staffing and management or some other change related issues or external issues are related to the project can affect the project proceedings and operations.

Project Complexity contains the elements like the function of variations and the number of varied, and then the number of interrelated elements, tasks or specialists and the complexity involved in it (Baccarini, 1996; Miller and Hobbs, 2005).

Agile methods also depends and directly associated to the customer involvement, and it is very important for achievement of goals of the project and getting the feedback from the customers / stakeholders, this is necessary as feedback to progressive operations are in functional mode and will be moving there through its life cycle. Agile methods allow the stakeholders an easy and frequent stakeholder interaction by implementing this methodology, Mann and Maurer (2005).

Agile methodologies use is done through the planning and spreading across the entire development phase of the project in which at different places we gather the information, Boehm (2002).

If we look in the current project and the success rate of projects then we see a interesting results where agile project management methods are getting very popular in some continuous changing environment / tasks / requirements either related cost, date, or some requirements associated with it, Magazinius and Feldt (2011). He also said that while examining the two different companies , one company which was using and the other company which was not using and have not adopted the agile methodologies are reported with no a big difference and the success in meeting time and budget goals and the causes of failure was not significantly different from one and other firm. Another important thing was he noticed that with the passage of time new techniques and methods are started in firms for the implementation of projects and achieving the goals and completing the needs and requirements of the project.

Project success contains a large amount of dealing of project complexity and intentionally fulfilling the all needs of the project accordingly which includes the time, cost, and performance, Kloppenborg et al. (2009). Project efficiency and overall project success is directly associated and they have a strong relationship, (Serrador and Turner, 2015). Fundamentally we can measure and evaluate the complexity between the two

possibilities to measure or evaluate, there are two ways of doing it; the first option is Direct option and second is the indirect option, which are related with using a measured value which can tell the complexity and the other is using economic effects of complexity respectively, Schuh (2017).

We can measure the project complexity by viewing the history of the different related in nature project and analyzing them on ground realities and checking them with core values of understanding and fulfilling the needs and requirements of the project with the help of combining the agile methodology use and project complexity respectively and accordingly to the nature of the project.As project complexity differs from project to project most of the projects these days are more complex literature shows that many of the uncertainties, complexity and changes in the information technology project can be reduced by using the agile methodology in software development projects (Dybå&Dingsøyr, 2008).Because software development projects require rapid feedback from the customers so that their requirements could be met successfully. Agile methodology helps in collaborative understanding of the customer's requirements. Availability of the rapid feedback available by using agile methodology can reduce the distance of developing the software project (Holmström, Fitzgerald, Ågerfalk & Conchúir, 2006).

Agile methodology provides the techniques and methods to reduce the complex software projects as the basic hindrance toward the success of such projects is project complexity. The software industry is moving toward agile which could make the complex situations simpler to handle, Problems can be easily solved by breaking down the problem and by true task distribution (Nayak & Patra, 2001). Complexities in the agile software development projects are handled by using agile techniquesn(Mishra, & Mishra, 2011).

These techniques are one of the best suited to handle the complex project situations as Lindvall et al. (2002) states that agile method is among the most appropriate method of reducing the complex statements of the project. So literature shows how complexity can be reduced by using agile methodology techniques. Thus following hypothesis can be proposed from the above studies

H2: Agile methodology is positively related to project complexity

2.3.Project Complexity and Project Success

Complex systems are difficult to understand and to work with. If we talk about the project industry most of the information technology projects fail due to complexity and technology specifications which are complex and complicated to understand. Most of the projects have met failure just because of the complexity of the project. Project complexity is negatively associated with the success of the project (Tatikonda & Rosenthal, 2000).

There is a need to work on those causes which could make the project more complex and in result lead to failure. Complex projects are those where we know that project goals implementation strategies etc are not certain and they are difficult to understand here these complexities actually leads to the failure of the project, by working on the causes which cause project complexity increases the chances of success of the project (Gidado, 1996).

There is not just need of governance to implement and execute the project the governance should also be provided by the top managers and the top executives to understand the complexity of the projects so that team could understand what they are going to do and if the project managers are able to deal with the complexity of the

project they can achieve success (Thomas & Mengel, 2008) so there is a need to deal with the complexity and reduce it in every possible way.

The most difficult situation in the projects is to handle the complex projects which are adding significant challenging scenarios for the project managers and this complexity is increasing because of the dimensions of the project if we handle the dimensions of the complexity faced in the projects we can achieve success. Dimensions of project complexity improve project success (Xia & Lee, 2004).

Projects mostly have characteristics of novelty and complexity which are necessary to be tackled in order to achieve the desired project goals, as through applying these characteristics of novelty and complexity individual project goals can be measured through measuring technical performances of the employees by letting them tackle the complexity along with novelty which directly leads towards project success if all the process has been done through effective monitoring of performance during dealing with complexity (Tatikonda & Rosenthal, 2000).

Research has revealed that project complexity has been the focal point of attention because it initiates the bottle neck consequence in the project and previously there was not a specific solution for that project complexity so it was neglected or subjectively assumed in order to overcome it, hence project complexity is one the major elements of the project characteristics which is needed to be properly overlooked in order to maintain cost and time baselines along with competing the market trends which clearly states that complexity can directly influence the project success (Gidado, 1996).

According to complex nature of latest projects with innovation and creativity, it has been concluded that conceptually the complexity of the project has a negative relation with the

project performance which in return affects the project success in a negative way as complexity increase the competition and complication even in the minor phases of the project especially during managing transaction relating costs to manage the project complexity and also by facilitating the collaborative interaction, empirically project complexity influence the project outcomes to achieve success in the organizational network (Moore, Payne, Autry, & Griffis, 2016).

Research also has concluded that project complexity can have integrated consequences through direction, communication and control, which have been widely utilized to manage the project management process but influence the project goals in a negative manner but in order to understand the upper and lower levels of complexities effectiveness and efficiency of project manager is needed because project complexity is very crucial problem as it is closely related to the performance parameters of project team in a project management process while generalizing the process of achieving project success (Abdou, Yong, & Othman, 2016). Hence, from the above discussion it is proposed that

H3: Decrease in project complexity is positively associated with the success of the project.

2.4. Project Complexity Mediates The Relationship Between Agile Methodology Use And Project Success

"Project complexity is 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." (Baccarini, 1996; Edmonds, 1999; Marle, 2002; Austin et al., 2002; Vidal et al.,2008).In the dimensions of Project planning and execution; the Project complexity is most important to focus on (Baccarini,

1996).The failure rate of the complex information technology projects is surprisingly high and many of the software development projects fail due to the complexity of the projects (Jones, 1996). The best way to handle those complexities is to handle and understand the requirements of the users so that projects could be implemented due to customer requirements resulting in success of the projects. Most of the software development projects fail due to reprehensible handling of the user requirements (Standish, 1994).

Several studies like Baccarini(1996) proved that project complexity has negatively impact the project outcomes, when projects are highly complex they are difficult to manage and difficult to achieve project objectives.Meyer and Utterback(1995) studied that technology incorporation in which several number of technologies,they positively concomitant with project complexity development. In similarity to the others' studies, Larson and Gobeli (1989) proved that project complexity has no relationship with the project performance (project success) and the quality of project. Dvir and Lechler (2003) explained that project complexity negatively mediates between strategic planning and project success, complex project negatively affect the effective project planning that lead towards the project success.

According to Aitken & Crawford (2007) project complexity negatively affects the innovative project and innovative project performance, as more complexity is involved in innovative project they are hard to handle they require some formalized methods (like agile methodology) to achieve success of the project.

User requirements can be successfully met by agile methodology usage (Paetsch, Eberlein & Maurer, 2003).The iterative approach helps to consistently contact and meet the user requirements so it is best suited when it comes to complex environments where

there are difficult goals and specifications of the customers.Using agile methodology to meet the customer requirements is the emerging trend of the software industry and proper agile methodology usage leads to the success of the project (Elssamadisy, 2008). Some companies fail to understand the implementation of agile methodology and lead to failure of the project so for meeting the complexities agile methodology is used and agile methodology usage leads to the success of the projects.

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H4: Project complexity mediates the relationship between agile methodology usage and project success.

2.5. Management Support Moderates The Relationship Between Project Complexity And Project Success.

As management role is very essential in this relationship, Management support is also the managerial support. Leaders (managers) are those who influence the group of individual to achieve goals through common efforts (Northouse, 2007).George (2003) succinctly states: "we want leaders (managers) who lead with values, purpose and integrity; a leader who make enduring organizations, leaders also have the ability to motivate employees to provide excellent customer services, and make long term shareholder value" in this way management support is very essential in the organization. The complexity of the projects can be reduced by many ways among them one of them is support of the manager (Flynn & Flynn, 1999). If the manager is able to understand the complex situations he communicates it to the team and complex situations are met easily. Many studies provide clear evidence related to the importance of management support to understand the complex situations and lead the organization toward success.

According to different researches high leader (manager) support positively affect all types of performance like individual performance (Wayne et al., 2002) group performance (Liden et al., 2006) and in-role performance (Chen, Lam, & Zhong,2007)

Among the success factors which lead to the success of the project, management support is considered to be a critical factor to successfully implement complex information technology projects (Sharma & Yetton, 2001). Management support can uplift the possibility of success of the project. Literature supports that Information systems development can be successfully done with managerial support, it is considered as a

challenge for the managers (Sheferaw, Negash & Amoroso, 2009; Sharma & Yetton, 2001).On the other hand it is seen that top management not only supports the middle managers and staff it also helps in successful implementation (Dong, Neufeld & Higgins, 2009).

Management support is the basic thing to exploit and gain benefit to successfully implement the management information systems (Jarvenpaa & Ives, 1991). Involvement of the executives is successfully involved to achieve the firm's performance (Jarvenpaa & Ives, 1991). Management support is considered to be important in all phases of planning execution and implementation (Somers & Nelson, 2001).

The complexity of the projects can be reduced by many ways among them one of them is support of the manager (Flynn & Flynn, 1999). If the manager is able to understand the complex situations he communicates it to the team and complex situations are met easily. Many studies provide clear evidence related to the importance of management support to understand the complex situations and lead the organization toward success.

Among the success factors which lead to the success of the project, management support is considered to be a critical factor to successfully implement complex information technology projects (Sharma & Yetton,2001). Management support can uplift the possibility of success of the project.

Literature supports that Information systems development can be successfully done with managerial support, it is considered as a challenge for the managers (Sheferaw, Negash & Amoroso,2009; Sharma & Yetton, 2001).On the other hand it is seen that top management not only supports the middle managers and staff it also helps in successful implementation (Dong, Neufeld & Higgins, 2009). Management support is the basic

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On the base of previous literature the present study is attempting to develop and test the following hypothesis;

H5: Management support moderates the relationship between Agile methodology usage and project success; such that if Management support is high than the relationship between agile methodology usage and project success would be strengthened.

2.6.Summary

The section has shown and support that agile methodology use impacts the project success and it increases the projects success by implementing this strategy. Planning is an essential part of any projects execution for its success. Agile methodology use implication beside this upfront planning is not just enough to carry out the execution of agile methodology use and achieve success in the projects in which we are actually following the agile methodology because of the abrupt and aggressive market conditions and changing customer demands it is very much important that we should update our plans and redefine them before their implementation especially in the agile methodology. Project Complexity is another major era which is directly proportional to failure it is not handled with proper planning; but it can be decreased with the managerial support and keep motivated on the track for completion of over project successfully. Moreover once we have defined a plan and we have upgraded it according to the customer's demands, the next thing that we have to do is to share the information amongst the team, which is

base area of agile methodology use. This practice is being followed not only by the agile methodology projects but it is also evidenced by literature that many other industries and traditional project management approaches consider the importance of sharing information to the team so that they could well understand the task and produce better performance and results. Agile methods also depends and directly associated to the customer involvement, and it is very important for achievement of goals of the project and getting the feedback from the customers / stakeholders, this is necessary as feedback to progressive operations are in functional mode and will be moving there through its life cycle. If the organization will be effective to run its system and produce beneficial results then the project will be an ultimate success.

2.7.Research Model

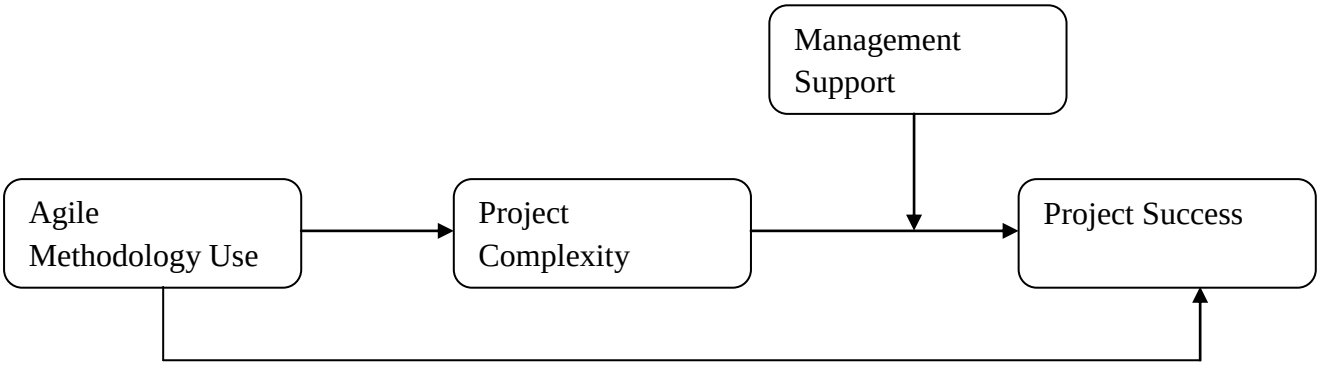


Figure 1.1: Research Model of Impact of Agile Methodology Usage on Project Success with the Mediating Role of Project Complexity and Moderating Role of Managerial Support.

CHAPTER 3

METHODOLOGY

3.1.Introduction

In this chapter, the methodology is described which is used to find out relationship of agile methodology use and project success, with the mediating role of project complexity and moderating role of manager support. The methodology chapter deals with data collection techniques (population and sample). And also highlights measurement and instrument reliability analysis.

3.2.Research Design

Research design is a framework of research plan of action. Zikmund (2003) defines research design is the plan of the researcher that specifies the procedure and method for collecting and analyzing necessary information. In the research design includes time horizon, types of setting and unit of analysis which are discussed below.

3.3.Types Of Study

This is a correlational study where the relationship of agile methodology use and project success, with the mediating role of project complexity and moderating role of manager support was measured on basis of self- reported perception.

3.4.Study Setting

The participant for study from the field because the supervisor and their subordinate contacted in project base public and private organization and was contacted to fill the questionnaire in their natural work environment.

3.5.Time Horizon

The data were collected in one and a half month for this study, the data in nature cross sectional and collected at one time.

3.6.Unit of Analysis

The unit of analysis is can be an object or individual whose character and features is to be analyzed. Unit of analysis can be either dayd, individual, group, industry, organization, country or cultured from the where data are collected. For this study unit of analysis was individual private and as well as development project based organizations Project manager and employees from Islamabad and Rawalpindi.

3.7.Population

Population is set of peoples, events, things connected with interest that the researcher wants to investigate. The current study population is employees of project based organization from Islamabad, Rawalpindi.

3.8.Sample

Sample is the component of the population represents whole population; O`Leary (2004) defines sampling as the process by which a researcher selects an example of participants for just a study from the population of interest. Convenient sampling was used, the sample size is 400 and 255 questionnaires were used for analysis.Data were collected by personally visiting the software houses and by virtually distributing the questionnaire among the organizations. Due to shortage of time the data will be collected by convenient sampling. The respondents would be assured regarding the aspect that whatever the information they would provide will be kept highly confidential in order to encourage participants to provide authentic data related to the topic and they would be

pledged that all the information which is being gathered is solely for academic purpose in order to get insight about what is role of Agile methodology use in the project's success while the projects are complex in nature.

3.8.1. Sample Characteristics:

The table below represents sample characteristics

3.8.2. Table of Gender (RepresentsGender Percentage)

	Frequency	Valid Percent	Cumulative percent
Male	188	73.7	73.7
Female	67	26.3	100
Total	255	100	

First table represents the gender composition of the sample in which 73.7% were male and 26.3% female. The male percentage is high.

3.8.3. Table of Age (Respondent's Age Distribution)

	Frequency	Percent	Cumulative percent
18-25	65	25.5	25.5
26-33	124	48.6	74.1
34-41	56	22	96.1
42-49	5	2	98.1
50 above	5	2	100
Total	255	100	

Table 2 shows the composition of the sample with reference to age groups. 25.5% of respondents age were 18-25, 48.6% respondents age were 26-33 range, 22% respondents age were in 34-41 range, 2% respondents age were in 42-49 range and just 2% respondents were more than 50years. In thisstudy, the percentage of 26-33 respondents is high.

3.9.Qualification

Qualification of respondents is listed in the table below.

3.9.1. Table of Respondents Qualification

	Frequency	Valid Percent	Cumulative Percent
Inter	8	3.1	3.1
Bachelor	17	6.7	6.7
Master	96	38	90.2
MS/MPhil	134	52.2	100
Total	255	100	

In the above table represent the respondents qualification, inter qualified was 3.1%, bachelor qualified was 6.7%, master qualified was 38% and MS/Mphil qualified was 52.2%, in table 3 the master qualified percentage is high.

3.10. Work Experience

In below table 4 explain the respondent work experience

3.10.1. Table of Experience of Respondents

	Frequency	Valid Percent	Cumulative percent
0-5	119	46.7	46.7
6-10	65	25.5	72.2
11-16	48	18.8	91
17-22	14	5.5	96.5
23-28	6	2.4	98.5
>29	3	1.2	100
Total	255	100	

In above table 4 represent the respondent experience of the work, in which high percentage of respondents work experience is 46.7% in range (0-5), in range (6-10) the respondents experience were 25.5%, in category (11-16) the respondents experience were 18.8%, in category (17-22) the respondent experience were 5.5% , in category (23-28) the respondent experience were 2.4 % and above 29 is 1.2%.

3.11. Measurments

In this study close ended questionnaires wereusedto measure four variables. The questionnaire would be measured on 5 point likert scale where 1 (strongly disagree) to 5 (strongly agree), unless otherwise stated.

3.12. Instrumentation

Data was measured for this study was analyzed by using adopted questionnaire from past valuable studies including Agile Methodology Use, Project Complexity, Management Support and Project Success. The questionnaire were filled by the employees and the managers who were playing the key role in software projects who imply Agile methodology Use for their projects. The questionnaire were measured on 5 point likert scale where 1 (strongly disagree) to 5 (strongly agree), unless otherwise stated. All the questions related to the variables were studied through 5 point likert scale with additional demographic studies measuring the respondents Gender, Age, Qualification and Experience.

3.12.1. Agile Methodology Use

This was measured through 10 items scale which was developed by (Maruping,Venkatesh&Agarwal, 2009) In 2009 they developed a scale for measuring and operationalizing the construct to analyze impact of Agile Methodology Use. The responses will be obtained through 5 point likert scale which includes the responses to be measured as

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

The items of the scale are “Pair programming”

- How often is pair programming used on this team?

- On this team, we do our software development using pairs of developers.
- To what extent is programming carried out by pairs of developers on this team?

The items of the scale are “A Continuous integration”

- Members of this team integrate newly coded units of software with existing code.
- We combine new code with existing code on a continual basis.
- Our team does not take time to combine various units of code as they are developed.

The items of the scale are “Refactoring”

- Where necessary, members of this team try to simplify existing code without changing its functionality.
- We periodically identify and eliminate redundancies in the software code.
- We periodically simplify existing code.

3.12.2. Project Success

In order to analyze Project Success of software or the application Tiwana, Amrit, and Ephraim R. McLean (2005) proposed the questionnaire, it was used which included 3 items. The replies will be acquired by 5 point Likert scale ranging from 1 to 5,1= strongly disagree and 5= Strongly Agree. The items of the scale are :

1. In light of marketplace-mandated changes and new business requirements that arose during project execution, at the present time, this project delivers all desirable features and functionality.

2. In light of marketplace-mandated changes and new business requirements that arose during project execution, at the present time, this project meets key project objectives and business needs.
3. In light of marketplace-mandated changes and new business requirements that arose during project execution, at the present time, this project overall is very successful.

3.12.3. Managerial Support

In order to analyze Managerial support software or the application a scale was adopted it included 15 items scale was developed by(Elie-Dit-Cosaque, Pallud&Kalika, 2011). The replies will be acquired by 5 point Likert scale ranging from 1= strongly disagree 5= Strongly Agree. The items of the scale are,

1. The senior management of my company supports best practices in using information technology.
2. My boss is very supportive of PC use for my job.
3. My boss strongly encourages me to make better use of information technology.

3.12.4. Project Complexity

In order to analyze Project Complexity of developed software or the application developed the scale (Xia & Lee, 2005) it included 15 items. The replies will be acquired by 5 point Likert scale ranging from 1= strongly disagree to 5= Strongly Agree. The items of the scale are:

1. The project team was cross-functional.
2. The project involved multiple external contractors and vendors.
3. The project involved coordinating multiple user units.

3.13. Reliability

In order to test the reliability of the data.Reliability test was run in spss 20.0 to test the reliability of the instrument used.

3.14. Pilot testing

The table shows the reliability analysis of instruments. First, we collected 50 questionnaires from authentic respondents for pilot study we checked the reliability of this scale,the detail is given below. Nunnally and Bernstein (1994) explained the standard of chronbach's Alpha is more or equal.70.

3.14.1. Table of Analysis of reliability

Variables	Items	Cronbach's alpha
Agile Methodology Use	10	.774
Project Complexity	15	.851
Project Success	3	.867
Managerial Support	3	.833

Agile Methodology Use cronbach's alpha value is .774 in the current study, the cronbach value of Project Complexity in that study is .851, the Project Success cronbach's value is in the current study is.867 and Managerial Support value of cronbach's is .833

CHAPTER 4

RESULTS

Statistical Package for Social Science (SPSS) was used for one way ANOVA to find out covariates, data normality, reliability, validity analysis for measurement model and hypothesis testing. Current chapter includes results of the study. Descriptive statistics, correlations, alpha reliabilities and results of linear and moderated multiple regression analysis are presented in both narrative and tabular forms. In addition, discussion on study findings, theoretical and practical implications, strengths and limitations of the study, and directions for future research are also discussed.

4.1.Control Variables

Barrick,Bradley, Brown and Colbert (2007) found that the size of organization and age performing the project, project team size, PM experience ,project duration, educational level and gender have been influence the project success, so these variables were considered to be covariates Aga, Noorder haven and Vallejo (2016) also used these variables as covariates. Results in table 6,shows insignificant difference in project success across Gender (F=3.11, P=.07), insignificant difference across Age (F=.581, P=.67) insignificant difference across Qualification (F=1.18 , P= .317) and insignificant difference across Experience (F= 4.06, P= .001)

4.1.1 Table of One Way ANOVA

Covariates	***F Value***	***Sig.***
Gender	3.11	>.005
Age	.581	>.005
Qualification	1.18	>.005
Experience	4.06	>.005

4.1.2. Table of Reliability Analysis

Reliability analysis refers to the fact that a scale should consistently reflect the construct it is measuring. if the measurements are repeated a number of times. The analysis on reliability is called reliability analysis. Thus, if the association in reliability analysis is high, the scale yields consistent results and is therefore reliable.

Variables	**No. of Items**	***Cronbach's alpha (α)***
Agile methodology use	10	.774
Project complexity	15	.851
Project success	3	.867
Managerial support	3	.833

The table 7 is showing the, reliability analysis which refers to the ability of a scale to give the same results consistently when tested a number of times. The Cronbach Coefficient Alpha (internal consistency reliability) value ranges from 0 to 1. Alpha values "0.7 "are considered to be more reliable whereas values below 0.7 are considered to be less reliable (Nunnally& Bernstein 1994). Table 7 shows that, Cronbach

Coefficient Alpha value of Agile methodology use was .774, Project complexity was .851, Project success was .867 and Managerial support was .833.

4.2.Results ForHypothesized Variables

SPSS was used for descriptive and correlation analysis.

4.3.Descriptive Analysis

The Descriptive technique tells us about the univariate summary statistics for different variables in one table and calculates its standardized values. The descriptive statistic includes basic details like sample size, minimum and maximum values, mean values and standard deviation values of the data. Descriptive statistics of the current data were given in Table 8 First column of the table gives the details of the variables. Second, third, fourth, fifth and sixth columns inform about sample size, minimum value, maximum value, mean and standard deviation respectively.

4.3.1. Table of Descriptive Statistics

Variables	N	Min	Max	Mean	SD
Agile methodology use	255	1.40	5.00	3.78	.58
Project complexity	255	1.09	5.00	3.81	.70
Project success	255	2.21	5.00	3.80	.53
Managerial support	255	2.29	5.00	3.94	.55

Table 8, shows that sample size was 255 for all the four variables. All variables (agile methodology , project complexity, manager support and project success) were rated on a five point Likert scale, such as 1 representing “Strongly Disagree” and 5 representing “Strongly Agree”. Mean values show the essence of responses. This is respondents’ observation regarding a particular variable. The mean values of the Agile Methodology

Use (AMU) was 3.78 which shows that respondent were agreed. The mean values Project Complexity (PC)was 3.81 which indicate that respondents were agreed. The mean value of Project Success (PS) was 3.80 which indicate that respondents were agreed that they have success in projects. Finally, the mean value of manager support was 3.94 that represents that respondents were agreed .

4.4.Correlations Analysis

Correlation analysis is a method of statistical evaluation used to study the strength of a relationship between two, numerically measured, continuous variables

4.4.1. Table of Correlation Analysis

	Variables	1	2	3	4
1	Agile methodology use	1			
2	Project complexity	.408**	1		
3	Project success	.140*	.300**	1	
4	Manager support	.172**	.230**	.326**	1

N=255, *p < 0.05 **p < 0.01. Correlation is significant at 0.01 levels (2-tailed); Correlation is significant at 0.05 levels (2-tailed); alpha reliabilities are given in parentheses.

This table presents the correlations for all theoretical variables. Agile methodology was significantly correlated with project complexity (r=.408, p<.01), Project success (r=.140, p<.01) and manager support (r=.172, p<.01) and in the expected direction.project complexity was significantly correlated with Project success (r=.300, p<.01) and manager support (r=.230, p< .01) and in the expected direction. Project success was significantly correlated with manager support (r=.326, p<.01) and in the expected direction.

4.5.Regression Analysis

SPSS was used to test the hypotheses, and Anova test showed that they were insignificant and results shown in table 10 Gender, Age, education, and experience were used as demographics and significant difference found in project success across the demographic variable experience, experience was entered as control variable.

Hypothesis 1 states that agile methodology is positively related to project success. Results reject this hypthesis, as indicated by the regression coefficient (β=**-.**01 ,P=.37) as the **P>.05**. Hypothesis 2 states that agile methodology positively related to project complexity. Results supported this relationship, as indicated by the regression coefficient (β= .49, P= .00) here as the **P<.01** and it is accepted. Hypothesis 3 states that project complexity is negatively related to project success. Results, established this relationship, as indicated by the regression coefficient (β= .12, P= .00) in this hypothesis **P<.01** and it is accepted. Hypothesis 4 states that project complexity mediates the relationship between agile methodology and project success. A 95% BC bootstrap CI of **-.**24 to-.01 shows that there was mediation in the model and hypothesis 4 is accepted. Hypothesis 5 states that manager support moderate between project complexity and project success and result accepted that hypothesis because of significant result (β=.21, p=0.00).

		B	*SE*	*t*	*p*
agile methodology ⟶	Project Success	-.01	1.12	-.88	.37
agile methodology ⟶	Project complexity	.49	0.6	7.1	.00
Project complexity ⟶	Project Success	.12	.30	3.4	.00
int_term ⟶	Project Succes	.21	.07	2.8	.00

	LL 95% CI	UL 95% CI
The Mediating Effect of Project complexity and Moderating effect of MS		
Bootstrap results for indirect effect	-.24	-.01

Note. Un-standardized regression coefficients reported. Bootstrap sample size 1000.
LL = Lower limit; CI = confidence interval; UL = upper limit

The hypothesis Agile methodology usage is positively and significantly associated with project success got rejected. In the second hypothesis the Agile methodology has the t value of 7.1, which shows high significance level of the relationship. As the t value which is greater than 2 it shows that the results are significant. Hence in this hypothesis the t value of 7.1 indicates statistically significant relation of project complexity and project success. And the B co-efficient comes out to be .49 which shows that if there is a one unit change in agile methodology then there is a probability that agile methodology would influenceand decrease the project complexity by 49%.

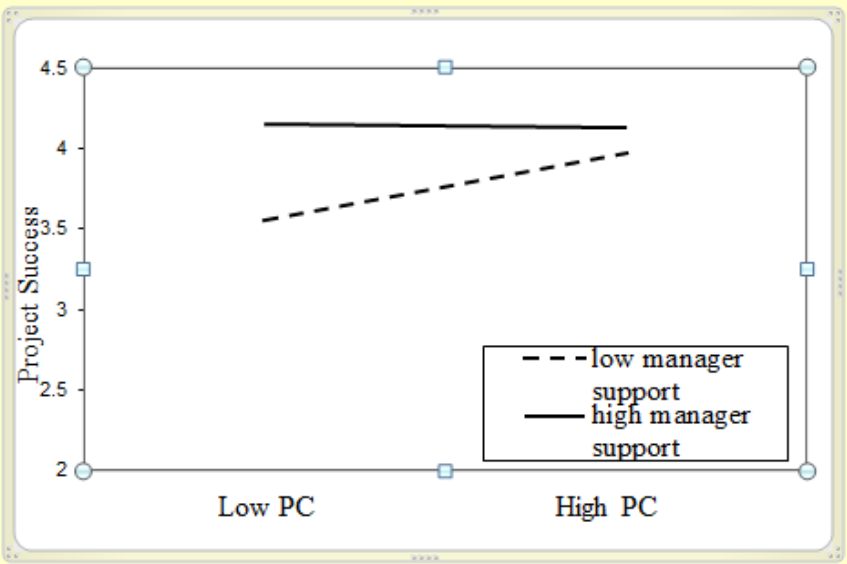
Project complexity has the t value of 3.4, which shows high significance level of the relationship. As the t value which is greater than 2 it shows that the results are significant. Hence in this hypothesis the t value of 3.4 indicates statistically significant relation of project complexity and project success. And the B co-efficient comes out to be .12 which

shows that if there is a one unit change in project complexity then there is a probability that decrease in project complexity would increase the project success by 12%.

In the hypothesis number 4, According to the analysis this hypothesis is accepted as project complexity plays a significant mediating role between agile methodology use and project success. As it is indicated by the results that there is no zero present in the bootstrapped 95% interval hence CI of .09 to .54 shows that there was full mediation in the model and regression coefficient was significant (β= .11, p= .00).

and in fifth hypothesis As it is indicated by the results that there is no zero present in the bootstrapped 95% interval hence that hypothesis got accepted because of significant result (β=.21, p=0.00).

Further, we plotted a graph and slope tests show that when Manager Support was high the relationship between Project Complexity and project success was high, and however at low was low the relationship between Project Complexity and Project Success,significant Moderation.



Mod Graph - Interacting effect of Project complexity and Managerial support

4.6.Hypothesis Summary

H1: Agile methodology usage is positively and significantly associated with project success.(Rejected)

H2: Agile methodology is positively related to project complexity. (Accepted)

H3: Project complexity is associated with the success of the project.(Accepted)

H4:Project complexity mediates the relationship between agile methodology usage and project success.(Accepted)

H5: Management support moderates the relationship between Agile methodology usage and project success; such that if Management support is high than the relationship between agile methodology usage and project success would be strengthened. (Accepted)

CHAPTER 5

DISCUSSION

5.1.Introduction

This chapter includes hypothesis relationship details and also their justification of acceptance and rejection including the theoretical implication, practical implication, strengths and weaknesses of the study and future directions, detailed discussion about understudied hypotheses is as following:

H1: Agile Methodology Use Is Positively And Significantly Associated With Project Success.

The first variable studied in this research paper is the relationship of agile methodology on project success. Results suggest that there is no significant relationship found between agile methodology and successful implementation of the software development projects so this suggests that in this changing market the demand is to shift toward those methods which are recognized and which would deliberately lead us to the success of the projects. They should analyze the methods being followed in their organizations along with those which suggest us that latest methods should be used along with the fact that whether we are capable of implementing such methodologies or not.

Literature suggests that agile methodlogy is the most emerging trend and a collaborative technique required at each iteration of the project which leads to successful project implementation in many ways (Stankovic, Nikolic, Djordjevic& Cao, 2013;Mann & Maurer, 2005; Budzier&Flyvbjerg, 2013),but in Pakistani culture collaboration on some specific

method is missing as different members of team required different level of speciality and skills and it take time to train each members of the team regarding any new method.

Regardless of the fact some studies provide arguments by suggesting that it is not necessary to implement the agile methodlogy for successful implementation mostly in the large projects where we have extended team network but it was still suggested to be affective technique in small infrastructural projects (Paasivaara, Lassenius&Heikkilä, 2012). In the current market scenario most of the Pakistan's projects have lack of collaboration with the customers as well as many of Paksitani projects follow traditional methods.

H2: Agile Methodology Is Positively Related To Project Complexity

This hypothesis got accepted. The results of the current study shows significant relationship (B= .49, t= 07.1, P= .00).

Hence the past literature also provides evidence for the above analyzed hypothesis (Schuh et al. 2017; Baccarini, 1996; Miller and Hobbs, 2005; Dybå&Dingsøyr, 2008; Holmström, Fitzgerald, Ågerfalk&Conchúir, 2006; Nayak&Patra, 2001).

Project complexity is the element which has got the most attention in the recent era, as agile methodology is having a iterative and continuous interaction with customers for getting the right information for the implementation and execution of projects proceedings with the ongoing information sharings with the stakeholders makes the project complexity lower. Hence, in this way the project moves to the success for achieving of its needs and requirements.

H3: Decrease In Project Complexity Is Positively Associated With The Success Of The Project

This hypothesis got accepted. The results of the current study shows significant relationship(*B*= *.12*, *t*= 03.4, *P*= .00).

Therefore the result analyzed above is supported by the past literature and past researches that provide evidence that decrease in project complexity positively influence the project success by managing project management process(Tatikonda& Rosenthal, 2000; Gidado, 1996; Thomas&Mengel, 2008; Xia & Lee, 2004; Moore, Payne, Autry, &Griffis, 2016; Abdou, Yong, & Othman, 2016).

In this era Projects has gain a lot of popularity and at the same time novelty and complexity has been increasingly diluted as a major characteristics of the projects with the passage of time in order to meet and gain the competitive advantage throughout the globe for proactive development and success of the project but at the same time high level of complexity tends to reduce the consequences of project success due to increase in the level of complications. Hence it is obvious that reducing project complexity will automatically prevail and initiate ease in performing tasks and activities of the project to meet the required project goals to achieve success.

H4: Project Complexity Mediates The Relationship Between Agile Methodology Usage And Project Success.

According to the analysis this hypothesis is accepted as project complexity plays a significant mediating role between agile methodology use and project success. As it is indicated by the results that there is no zero present in the bootstrapped 95% interval hence

CI of .09 to .54 shows that there was full mediation in the model and regression coefficient was significant (β= .11, p= .00).

Many studies also provide evidence about the significance role of project complexity as a mediator between agile methodology use and project success (Elssamadisy, 2008).

Project success is inversely proportional to the project success rate as the complexity increases the project gets complex and success decreases but with the help of agile methodology use it reduced to itsvery lower rate along with competing with novalty and complexity in the prevailing market by continuous interactions and information sharing with the stakeholders and developers and required output can be achieved with ontime right decisions.

H5: Management Support Moderates The Relationship Between Agile Methodology Usage And Project Success; Such That If Management Support Is High Than The Relationship Between Agile Methodology Usage And Project Success Would Be Strengthened

Analysis shows that this hypothesis got accepted as managing support plays a vital moderating role between agile methodology use and project success. As it is indicated by the results that there is no zero present in the bootstrapped 95% interval hence that hypothesis got accepted because of significant result (β=.21, p=0.00).

Past literatures and studies also provides a support for the moderating role of managing support between agile methodology use and project success (Northouse, 2007; George,

2003; Flynn & Flynn, 1999; Wayne et al., 2002; Bauer & Green, 1996; Kacmar, Witt, Zivnuska & Gully, 2003; Chen, Lam, & Zhong 2007).

In every project, management is the most ultimate dimension which is a vital necessasity of every phase in the project and along with that in projects managerial support is the most important key to project success, where as in agile methodology use the management is the backbone for decisions and planning for the new changes for the project.

5.2.Conclusion

In this study we have studied the domain of Agile Methodology use and its impact on project success, which is the most popular and important domain in the recent era of the projects management field, as agile methodology is the best working methodology and its success rate is very high as all the bugs are fixed in the first meetings and in the start of the execution of the project. The main aim of this study is to find out the impact of agile methodology use on project success. Also this study has demonstrated the project complexity as a mediator between the relationship of agile methodology use and project success. Along with that, this study has examined a unique role of Managerial support as a moderator between the relationship of Agile methodology use and project success.

The main contribution of this study is that this study has contributed a lot in the existing literature because there has been a limited work on study of the agile methodology use. In this study, there are 5 hypotheses which are being analyzed and tested according in the context of Pakistan. H1 (Hypothesis 1) is rejected ,Moreover H2(Hypothesis 2), H3 (Hypothesis 3), H4 (Hypothesis 4) and H5 (Hypothesis 5) all are being accepted according to the Pakistani context.

Data for the analysis of this study was collected through questionnaires, which were distributed to the project based organizations of Pakistan mainly in the twin cities Rawalpindi and Islamabad. In total 400 questionnaires were distributed but only 255 were used for the analysis purpose because those 255 questionnaires were having the most appropriate and full information required for the analysis of the study.

This study was conducted in Software engineering and information technology projects in contextual setting of Pakistan results interpreted conclude that agile methodology use plays a vital role toward successfully implementing the projects in the software industry and the information about the software developing should be properly communicated and shared with the managers, co-managers and project complexity will be decreased with the help of managerial support and agile methodologies use, we can earn project success.

5.3.Theoretical and Practical Implication

This study has both managerial and theoretical implications while executing the agile methodology in real time projects it should be kept in mind that meeting complexity parameters are an important essence to successfully achieve the project goals. Management should consciously look at the level and depth of complexity as it is an important element to be solved and proactively dealt in the project. Moreover this study highlights and provides contribution toward agile methodology use for ptoject success theoretically. Agile methodology use is demanding the tranning sessions for proper implementation of this methodology for success of projects effectively to meet the requirements of the user. As market is continuously rushing toward applying agile methodology in every project as a

necessary element so it is essential to keep these important dimensions in mind essential for achieving project success while proactively dealing with project complexity.

5.4.Limitations Of Research

As every research has some reservations, this study also has some limitations which occurred mainly due to limited resources and time constraints. As data were collected from the project based organizations of Pakistan mainly from the twin cities Islamabad and Rawalpindi, hence the results might be quite different if the data were collected from all cities of Pakistan. Another limitation arisen due to the fact that, since it was a dyadic questionnaire, many difficulties were faced during the collection of data separately from both of managers and employees. Even many of the employees were not interested in filling the questionnaire so convincing them was a difficult task. Another limitation in this research was the use of convenience sample, as convenience sampling was used to collect data randomly from a large population, it limits the generalizability. Hence, the results might not be widely generalized. As, it was concluded after analysis that some results are not the same as what was expected in regard with the previous researches and literature, mainly due the highly power distance culture, that is why the results might not be applicable in a non-Pakistani context.

The data collected from individuals was collected from Pakistani software project industry. Itdefines that some cultural differences and contextual settings effect other factors around as well so, like every other social science research this was a limitation to this study. Additionally due to limited time and resources the data were only collected from the software houses of Islamabad and Rawalpindi and sample size was 255 which was not

enough to depict a true picture of software houses using agile methodology in the whole world. Like every other research there was also a limitation that respondents may not have filled up the data with complete attention blemishing the results and there was a chance of error along with the possibility that the respondents may not have particular knowledge about the study.

The data were collected from the Pakistani software development sectors which includes the small to large scale sector organizations, these organisations were having the employes strength of 10-50 developers and managers. As of Pakistani context the systems are not as much upgraded and uptodate with these terms and methodologies by which this can not predict the whole picture of study existence, but it tells about the information which is being floated amoung the Pakistani software development sectors.

The organizations from which the data were collected , their employees also informed about the use of tradional methodologies in the same manner of Agile methodology but they do not know the true picture and concept of Agile methodology use and its impact of the success of project in terms of proper use of time and understanding of the system in accordance with the managerial support and other connected ways to make the project successful.

Though the research model and results were properly analyzed but there may be variations and choices so in future the data should be collected in different contextual setting by increasing the sample size. Secondly the research was carried out in software industry of Pakistan so in future the impact of execution planning should also be studied in other industries as well. It can be investigated that whether we should doubt the traditional upfront

planning in other sectors or not. Thirdly it can be analyzed that whether other industries should shift toward agile project methodologies or not. Fourthly there are many other factors which are unexplored related to the agile methodology technique so those factors should also be studied which are impacting the agile industry and why different industries haven't still adopted the agile methodology even its worth doing.

5.5. Future Research Directions

In this study the model is being tested for the impact of agile methodology use on project success, but for future research directions these variables can be studied with other dimensions of agile methodologies use in construction, development creativity along with enhancement in the manager-employee relationship through other factors like team co-operation and creative self-efficacy. There is still a lot of room for further research, mainly the dimensions should be the customer interactions and customer orientation as it is purely focused on stakeholders.

Hence a lot more research can be done on this perspective in order to examine the domains in which creativity expectation can play a significant role in prevailing creativity in projects further more re-planning the planning of execution of projects should be checked with agile methodologies. Coram&Bohner (2005) also suggested to re-plan the planning in the execution of the project. Telecommunication sector, marketing sector by relating these sectors with such domain where creativity is highly required in jobs.

Agile methodologies use can be checked with the Psychological behavior and psychological impact of end product users. Comparison of different methodologies in Pakistan and how they can be modified in context of future improvement and project success. Agile

methodlogyuse is now the trerm especially for the sofrware community in terms of how the softwares are developing, how the developers are planning the requirements of the user and then dealing with the user need. Why organizations avoid the agile methodlogy and focus on the contract for small industries and the software development companies. New agilemethodologies adoptive parties and rejections on agile methodologies should be covered with the comparison of its pros and cons. New merging techniques and how the proper implementation of agile methodologies use can result in the success of projects either in the software or in the terms of health sciences and construction projects.

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7. Appendix

CAPITAL UNIVERSITY OF SCIENCE AND TECHNOLOGY, ISLAMABAD

Department of Management Sciences

QUESTIONNAIRE

Dear Participant,

I am students of MS Project Management at CAPITAL UNIVERSITY OF SCIENCE AND TECHNOLOGY, ISLAMABAD. I am conducting a research on **Impact of Agile Methodology Use on Project Success, Mediating role of Project Complexity and Moderating role of Managerial Support**. You can help me by completing the attached questionnaire, You will find it quite interesting. I appreciate your participation in my study and I assure that ***your responses will be held confidential*** and will only be used for education purposes.

Sincerely,

AsimRiaz
MS Project Management
CAPITAL UNIVERSITY OF SCIENCE AND TECHNOLOGY, ISLAMABAD

Please provide following information.

	1	2
Gender	Male	Female

	1	2	3	4	5
Age	18- 25	26–33	34-41	42-49	50 and above

	1	2	3	4	5	6
Qualification	Metric	Inter	Bachelor	Master	MS/M.Phil	PhD

	1	2	3	4	5	6
Experience	5 – 10	11 – 16	17 – 22	23 – 28	29 – 35	36 and above

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

	Agile Methodology Use					
1	How often is pair programming used on this team	**1**	**2**	**3**	**4**	**5**
2	On this team, we do our software development using pairs of developers.	**1**	**2**	**3**	**4**	**5**
3	To what extent is programming carried out by pairs of developers on this team?	**1**	**2**	**3**	**4**	**5**
4	Members of this team integrate newly coded units of software with existing code.	**1**	**2**	**3**	**4**	**5**
5	We combine new code with existing code on a continual basis.	**1**	**2**	**3**	**4**	**5**
6	Our team does not take time to combine various units of code as they are developed.	**1**	**2**	**3**	**4**	**5**
7	Where necessary, members of this team try to simplify existing code without changing its functionality.	**1**	**2**	**3**	**4**	**5**
8	We periodically identify and eliminate redundancies in the software code.	**1**	**2**	**3**	**4**	**5**
9	We periodically simplify existing code.	**1**	**2**	**3**	**4**	**5**
10	We run unit tests on newly coded modules until they run flawlessly.	**1**	**2**	**3**	**4**	**5**

	Project Success					
1	In light of marketplace-mandated changes and new business requirements that arose during project execution, at the present time, this project delivers all desirable features and functionality.	**1**	**2**	**3**	**4**	**5**
2	In light of marketplace-mandated changes and new business requirements that arose during project execution, at the present time, this project meets key project objectives and business needs.	**1**	**2**	**3**	**4**	**5**
3	In light of marketplace-mandated changes and new business requirements that arose during project execution, at the present time, this project overall is very successful.	**1**	**2**	**3**	**4**	**5**
	Managerial Support					
1	The senior management of my company supports best practices in using information technology.	**1**	**2**	**3**	**4**	**5**
2	My boss is very supportive of PC use for my job.	**1**	**2**	**3**	**4**	**5**
3	My boss strongly encourages me to make better use of information technology.	**1**	**2**	**3**	**4**	**5**
	Project Complexity					
1	The project team was cross-functional	**1**	**2**	**3**	**4**	**5**
2	The project involved multiple external contractors and Vendors	**1**	**2**	**3**	**4**	**5**
3	The project involved coordinating multiple user units.	**1**	**2**	**3**	**4**	**5**
4	The system involved real-time data processing	**1**	**2**	**3**	**4**	**5**
5	The project involved multiple software environments.	**1**	**2**	**3**	**4**	**5**
6	The project involved multiple technology platforms.	**1**	**2**	**3**	**4**	**5**
7	The project involved a lot of integration with other systems.	**1**	**2**	**3**	**4**	**5**
8	The end-users' organizational structure changed rapidly.	**1**	**2**	**3**	**4**	**5**
9	The end-users' business processes changed rapidly.	**1**	**2**	**3**	**4**	**5**
10	Implementing the project caused changes in the users' business processes.	**1**	**2**	**3**	**4**	**5**

11	Implementing the project caused changes in the users' organizational structure.	**1**	**2**	**3**	**4**	**5**
12	The end-users' information needs changed rapidly.	**1**	**2**	**3**	**4**	**5**
13	IT architecture that the project depended on changed rapidly.	**1**	**2**	**3**	**4**	**5**
14	IT infrastructure that the project depended on changed rapidly.	**1**	**2**	**3**	**4**	**5**
15	Software development tools that the project depended on changed rapidly.	**1**	**2**	**3**	**4**	**5**