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Impact of Agile Project Management Methodology on IT Project Success: Exploring the Mediating role of Team Communication and Team Empowerment

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Abstract

Based on the Resource Based View and Social Identity Theory, this endeavor intends to determine the influence of agile project management methodology on project success by applying the mediating role of team-level outcomes (team communication and team empowerment) on the relationship between agile project management and project success. The data gathered from 226 project team professionals working in the Information Technology sector of Pakistan. This endeavour utilized Partial Least Squares - Structural Equation Modeling to substantiate the direct and mediating effects. The result indicated that agile project management methodology significantly influences project success. Moreover, the result further validated that team communication and team empowerment mediate this relationship. There is a deficiency of an empirical investigation on the relationship between agile project management and project success in evolving republics context. This study makes a significant contribution to the field of IT project management by demonstrating that agile project management impacts project success while team communication and team empowerment mediate this relation. This is one of the earliest study that explores the inter-relationship among agile project management, project success and team outcomes.

Keywords: Agile Project Management, Team Communication, Team Empowerment, Project Success.

1. Introduction

At present, project success become the most prevailing trend of research in the arena of project management (Shaukat et al., 2022). Project success can be ascertain based on stakeholder satisfaction, the benefit achieved at firm level, and the success of the deliverables (Atkinson, 1999; Dubois & Silvius, 2020). An effective project is depend upon what the client wants and also to determines whether the developed project is performing the tasks for which the project was undertaken (Aga et al., 2016). PS can be considered as the success of the procedure, project and firm success (McLeod et al., 2012). PS lies on different situational factors and the methodology selected for a project (Siddiqui & Shaukat et al., 2023). It is broadly acknowledged that the methodology utilized to complete a project significantly augment superior project success. Research also highlighted that appropriate methodology must be given due consideration for efficient project execution. (Schwalbe, 2015).

The extant literature highlighted that project management methodology mainly consists of (a) a linear sequential life cycle model (traditional project management/waterfall model) (b) agile or iterative project management methodology (c) hybrid (Dhir et al., 2019; Marnewick et al., 2019). In traditional PM method, project success depends upon completing the project within the prescribed scope, schedule, and cost (PMI, 2013; Shaukat & Alam, 2023; Siddiqui & Iqbal et al., 2023). However, in APM methodology, project success is measured against customer satisfaction associated with the project (PMI-ACP, 2015). Agile PM is better than traditional methodology as in traditional methodology less attention paid to consumer relationship, a pre-established project scope, and focusing more on documented record (Serrador & Pinto, 2015).

Extant literature highlighted various research publications conferring the elements that affect project success and or failure (Latif & Nazeer et al., 2020; Siddiqui & Shaukat et al., 2023). Information Technology (IT) industry also faced these problems very widely (Gartner, 2018; Manfreda et al., 2018; Jia et al., 2018; Wafa et al., 2022). Following imperative problems have been pinpoint in IT sector projects:

- Lower the usage of information technology systems functionalities and software applications (Gartner, 2018).
- Communication issues with project stakeholders (Report Queensland Audit Office, 2011).
- Growing expectations to change the IT sector mindset globally (Manfreda et al., 2018).
- Rapidly changing and evolving consumer desires (Wafa et al., 2022).
- Lack of skills and aptitude to collaborate and form social relationships inside the organization to augment competitiveness (Jia et al., 2018).

To overcome these issues, agile PM approach considered the most effective and efficient methodology in collaboration with stakeholders (Hodžić, & Hrůzová, 2018; Gemino et al., 2021; Niederman et al., 2018). Agile methodology is a flexible methodology in which customers are fully involved during the software development process, iterative development, and implement changes simply and easily (Sun & Schmidt, 2018). In agile methodology, project team is empowered, and innovative they do the iterative development in which the customers receive each increment of software in short iterations (Dhir et al., 2019). To achieve a quick outcome, information technology projects mostly use the agile model (Henriksen & Pedersen, 2017). The main characteristics of agile methodology are interaction with personnel, operational application, flexibility to change, and stakeholder interaction (Campanelli & Parreiras, 2015). In addition, agile model is considered an evolutionary evolving IT project management approach (Gilb, 2007).

Project success depends on various factors alongwith agile method for instance, team communication and team empowerment (Harris & Sherblom, 2018; Williams, 2013). Scholars like Iqbal, Omar, and Yasin et al. (2019) posited that efficient team communication in agile methodology leads to PS. They further recommended that future studies should incorporate team-level variables in the complex research model.

Teamwork has been consider one of the most important capability needed at working environment (Latif & Williams, 2017). In view of Beck et al. (2001), teamwork is a central factor of the successful implementation of agile methodology. Agile PM required proactive support, mutual aid, and collaboration by project team. Ozigbo et al. (2020) stated that a project team integrate balanced skills for project success; though, it is essentials to be fostered over time. Latif and Shaukat (2020) argued that upcoming endevour pay more attention on team communication and empowerment to advance firm performance. Therefore, although team-work positively contribute to team and firm level, its intervening role in APM-PS relationship has been less explored (Iqbal et al., 2019).

The extant literature highlights numerous knowledge gaps concerning the role of agile method, team outcomes, and project success which requires scholars' consideration. First, even though the agile concern is emerging, however, the application of the agile method is still considerably underdeveloped (Ruk et al., 2019; Wafa et al., 2022). Project management professionals, however, have yet to infuse agile methodology to manage their projects in a more efficient manner (Radhakrishnan et al., 2022).

Second, literature highlighted that agile methodology role in project management has been less explored (Hodžić, & Hrůzová, 2018). Scholars like Gemino et al. (2021) argued agile method becomes critical to the attainment of new project management, particularly in the fields of IT-enabled business projects. They further stated

that APM-PS relationship remains unexplored empirically. Moreover, Niederman et al. (2018) stated that there is less pragmatic confirmation to specify what project consequences affected while using the agile PM method.

Third, the existing literature showed that the impact of APM on PS has been conducted by employing various mediating mechanisms (Jintian et al., 2022; Wafa et al., 2022). Agile methodology is an emerging concept, hence the direct association between agile and project success may further required a mediating mechanism. Existing research call for investigation of team outcomes variables such as team communication and team empowerment which further explain the effect of the agile method on performance outcomes (for instance, Harris & Sherblom, 2018; Iqbal et al., 2019; Williams, 2013; Ozigbo et al., 2020).

Fourth, Jovanovic et al. (2018) stated that the application of agile methodology practices has been continually growing in information technology firms. Since most of the prior research on the relationship between the agile method and project success have been performed in the Information Technology (IT) sector of the developed world context (Ghimire & Charters, 2022). The investigation of this link in the developing countries context is still in its infancy (Iqbal et al., 2019; Maqbool et al., 2018).

To fill these knowledge gaps we investigate the influence of the agile method on Information Technology PS. We also incorporate team communication and team empowerment as mediators in the association concerning APM and PS. Consequently, our research questions are:

1. Does agile project management methodology significantly impacts project success?
2. Does team communication mediate the relationship between agile project management methodology and project success?
3. Does team empowerment mediate the relationship between agile project management methodology and project success?

The present research contributes to the theory and literature in the different ways. At first, this research utilizes social identity theory (SIT) and the resource based view (RBV). According to SIT, personnel tends to classify themselves and others in social groups like organizational membership (Tajfel and Turner, 1979). The RBV perceives business setup as a collection of distinctive resources that act as the basis of the organization strategy and the key source of effectiveness (Barney, 1991). Agile methodology is rare, iterative, fast-growing, and valuable (Abrahamsson et al., 2017; Stankovic et al., 2013) like any other uncommon resource under RBV. This endevour enhances the literature on RBV and SIT by establishing the relationships between APM, team outcomes, and PS. Second, our research makes a significant contribution in the area of agile methodology implementation, which can be beneficial for the IT sector of Pakistan to recognize the importance of the agile model and encourage team communication and team empowerment of their employees to augment greater IT project success. Third, we introduced the mediating mechanism of team communication and team empowerment through which agile practices impact project success.

This study comprises several sections. A brief introduction of the topic and related research questions have been discussed first. Detailed literature support has been presented in section two. After that literature review, the conceptual model of the study was presented. Research methodology and results and analysis have been presented subsequently. Finally, the discussion, conclusion, and future direction chapter is presented.

Literature review and hypotheses development

Agile PM methodology and project success

Agile methodology is the most successful, dominant, and effective model used for the successful accomplishment of IT project management (Stankovic et al., 2013). The agile methodology is continuously evolving to handle the risk associated with a project and give a response to market changes consequently leading to project success. In agile methodology, project success is measured based on customer satisfaction, on-time delivery, project quality, and business value achievement (Beck, 2000). Scholars like Serrador and Pinto (2015) argued that the agile model focuses more on customer participation during the development process which is directly associated to project success. Software companies moving toward agile practices being projects are complex and required the right approach to handle uncertain customer requirements effectively for the achievement of project success (Batra, 2018).

The extant literature highlighted that there is a direct effect of APM methodology on PS. For instance, Phillips (2014) stated that the project manager handles external stakeholders, remove the impediment from the team, and take appropriate decision for project completion. Campanelli and Parreiras (2015) argued that the agile manifesto consists of four values which are individual relations, software utilization, client engagement, and prompt change response. These key features play a positive part in the success of a project. Henderson-Sellers et al. (2014) highlighted that agile methodology provides more qualitative, flexible, and business-orientated project outcomes. Agile methodology is a shared ownership model in which team contributes, participate, and encourages cooperation with each other to augment project success (Tam et al., 2020).

Boehm (2002) expressed that IT firms should carefully implement agile principles and practices for project completion and success. Conforto et al. (2014) argued that agile reduces the complexity of the project and provides innovative projects to the customers. The goal of the agile is to satisfy the project manager, team, clients, and project stakeholders. The agile practices not only reduce the project time it takes to complete as compared to

traditional methodologies but also increases project success (Budzier and Flyvbjerg, 2013). Bergmann and Karwowski, (2018) stated that agile methodology projects become effective methodology due to an integral part of human factors such as highly skilled and knowledgeable teams, cooperative management, involved customers, smaller manageable teams, properly guided by the managers, and information easily accessible and adaptive leadership.

The extant literature highlighted the significant contribution of agile to project management and success. For instance, in their research Rolstadas et al. (2014) expressed that agile offers more quality features for project management. Similarly, the agile methodology provides flexibility to the IT professional to implement required changes easily, this higher flexibility directly leads to project success (Cheng et al., 2009). According to McAvoy and Butler (2009) software companies better utilize agile practices which is why agile projects are more successful. Based on these lines of logic, we proposed the following hypothesis.

H1: Agile PM methodology has a positive and significant impact on project success.

Mediating role of team communication

Agile practices meet new market trends efficiently, better serve a competitive market, and provide innovative projects to the market due to the on-time information exchange between the team members (Papke-Shields et al., 2010). Scholars like Becerik-Gerber et al. (2012) underline that agile methodology can complete projects proficiently by augmenting the benefits of team communication. Similarly, based on Davis's (2017) research outcomes, team communication significantly contribute to project success. Moreover, team communication in agile methodology improves problem-solving skills and increases team member knowledge (Patrashkova et al., 2013). Additionally, a strong relationship is built between the team members through team communication. Park et al. (2012) stated that team communication establishes a sense of commitment, provides help in the decision making, and plays a central role in agile project success.

Team communication is essential for measuring agile project success (Schwalbe, 2007). Urdangarin et al. (2008) stated that inappropriate communication between team members can cause project delays and even sometimes become the basis of project failure. Due to this team communication gap is viewed as a critical project constraint (Stapel et al., 2009). Hence, team communication, collaboration, and coordination is the critical facilitating factor in the relationship between agile practices and PS (Wang & Howell, 2010).

According to Gupta et al. (2004), team communication plays a facilitation role in agile methodology because agile teams discuss complex requirements with each other to provide a distinctive solution to the customers' requirements. Agile methodology provides a platform to the project management team and encourages them to perform creative tasks providing a vigorous environment where team members strive for achievement/success. In agile methodology, team communication is done more efficiently as compared to traditional project management methodology (Demir et al., 2017). In agile methodology, project teams communicate with each other proficiently for the achievement of project objectives and strive for success (Henderson et al., 2016). Scholar like Lukusa (2020) argued that team communication in agile methodology not only enhanced project success but also provides a unique and quality-oriented project to the stakeholder. Information Technology firms should institute a comprehensive project team communication plan because cooperative teamwork increased project efficiency and productivity (Douglas et al., 2006).

The extant literature highlighted a significant mediating role of team communication in the relationship between APM and PS. For instance, Ryan and O'Connor (2013) underline that communication enables project team members to better understand customer requirements and deliver quality project outcomes to them by applying the concept from the agile model. Chen and Kuang (2010) found a positive impact of team communication on the relationship between APM and PS. Janssen et al. (2015) stated that strong internal team communication in agile methodology provides highly successful projects to the IT industry. Besides, team communication would extant agile model and project success relationship (Hsu et al., 2012). Based on these lines of logic we proposed the subsequent hypotheses.

H2: Team communication mediates the relationship between agile methodology and project success.

Mediating role of team empowerment

Team empowerment is a key component of agile methodology in which the team possesses all the skills required to deal with different situations and authorized to take decisions pertinent to the undertaken project (Cockburn & Highsmith, 2001). Team empowerment plays a vital part in agile methodology because the project manager gives authority to take managerial decisions for the project (Birkinshaw, 2018). In addition, the project team has more control over management decisions, and governance processes (Van Waardenburg & Van Vliet, 2013). Moreover, team empowerment in agile methodology produces more successful projects (Gerster et al., 2018).

Team empowerment plays a substantial role in the flexibility and innovation of agile projects (Annosi et al., 2016). Kirkman and Rosen (1999) presented different attributes of team empowerment which are all present in an agile team. The first one is potency defined as the team shared belief that a particular decision will be beneficial for the organization. The second one is meaningfulness defined as the team implementing the tasks

playing a significant role in the organization. The third one is autonomy defined as the level at which team members experience authority and power in the decision-making process.

According to Beck et al. (2001), a highly empowered project team develops the best design, produces unique features, and provides quality software to the customer. Harter et al. (2002) underline that team empowerment increases team productivity due to which agile project is more successful. Team empowerment is an important aspect of an agile team in which orientation and teamwork are done in a coordinated manner (Vidgen & Wang, 2009). Team empowerment increases the performance outcomes and the team finds meaning in the project (Kirkman et al., 2004). Team empowerment positively influences project success (Moe et al., 2019).

Team empowerment contributes to agile project success in terms of potency, meaningfulness, autonomy, and impact (Kirkman & Rosen, 1999). Team potency refers efficient utilization of team efforts which help in optimizing team performance in terms of project success (Jung & Sosik, 2003). Meaningfulness enables team members to jointly develop and exercise robust commitment to the project ensuing in producing a more successful project (Michaelson et al., 2014). Autonomy enables the agile team to take decisions and achieve project success (Dikert, 2016). The impact pertinent to team believe that their work will have positive enhance firm performance (Kirkman et al., 2004). The agile team implements the project in such a way that generates a affirmative impact on the IT firms producing successful projects (Shalley et al., 2004).

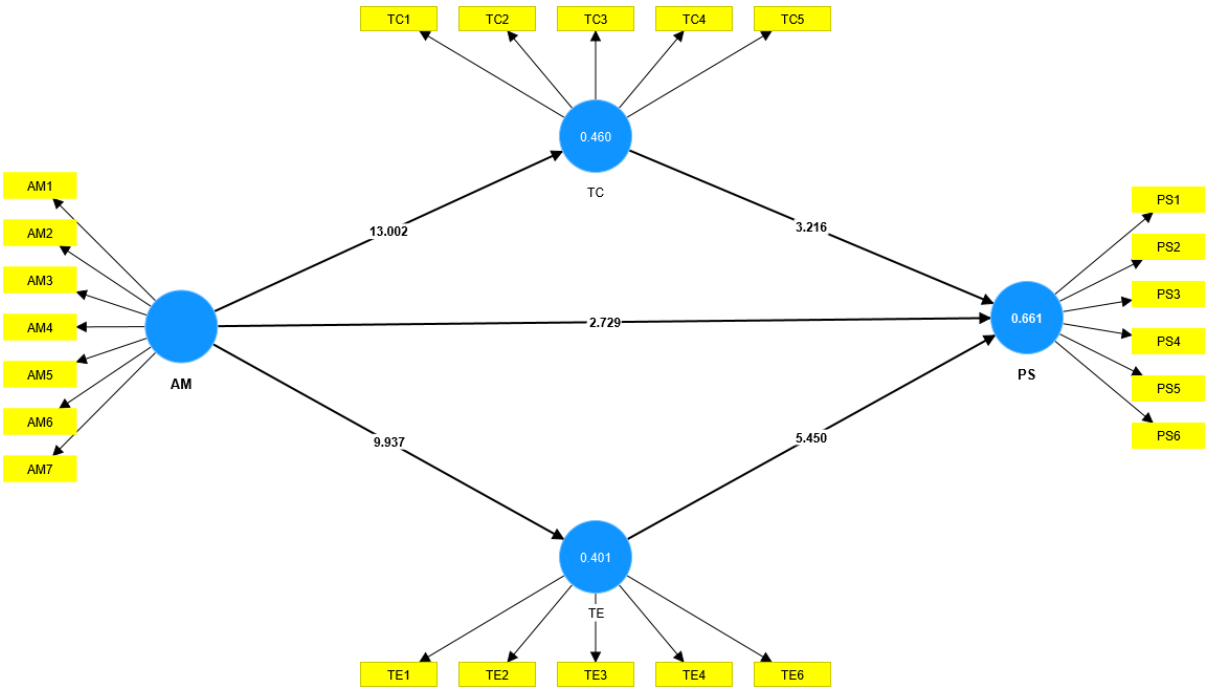
The extant literature highlighted a significant mediating role of team empowerment in the relationship between agile methodology and PS. Tian et al. (2015) argued that team empowerment enabled better ways to mitigate risks and bring sustainable outcomes which further augment agile project success. Similarly, Klein et al. (2009) found that mediating role of team empowerment in agile methodology is directly associated to project success. Gardner et al. (2012) underline that an empowered team in agile is capable of identifying and defining problems, discussing multiple solutions, evaluating the alternatives, and generating suitable solutions for the problems which help in the completion of project modalities. In addition, Hughes et al. (2020) stated that team communication positively influences the relationship between effective project management and PS. Besides, experienced and empowered team members can complete the project in an efficient manner (Hsu, 2017). Based on above, we proposed the following hypothesis.

H3: Team empowerment mediates the relationship between agile methodology and project success.

Research model

This endeavor comprises on 4-variables, naming agile PM methodology, team communication, team empowerment, and project success. Agile methodology is an independent variable and affects the remaining variables. Team communication and team empowerment are mediating variables that represent a relationship between dependent and independent variables. Project success is a dependent variable that is affected by rest of the variables.

Figure 2.1: Structural model



AM: agile methodology; PS: project success; TC: team communication; TE: team empowerment

Research methodology

Sample and procedure

Information Technology sectors are playing a protuberant role in the pecuniary progression of evolving republics (Jason & Geetha, 2019). Thus, the successful completion of software projects increasingly held the consideration of agile methodology in IT firms in emerging republics context, for instance, Pakistan (Maqbool et al., 2018). Earlier studies acknowledged the role of the agile model as a fundamental driver of IT software project success (Jason and Geetha, 2019). Software companies moving toward agile methodology because projects are complex and required the right methodology to handle uncertain customer requirements effectively for the achievement of project success (Batra, 2018). Therefore, it is imperious to examine the connotation concerning agile PM methodology and project success in those technologically equipped IT services firms (Tam et al., 2020). Therefore, we selected Information Technology sectors of Pakistan to evaluate relationship between the variables. Software-developing firms make up the study sample as these enterprises perhaps have a wider breadth/coverage of agile practices (Iqbal et al., 2019).

The present research is quantitative, cross-sectional, and survey questionnaire based. This research is a co-relational designed to determine the impact of agile methodology on PS with the mediating mechanism of team communication and empowerment. The Pakistan software industry has been approached to obtain the necessary data for further analysis and to generalize the result. The unit of analysis for this research were project managers and project team. A convenience sampling technique was utilized for data collection.

Data was gathered by personally distributed survey questionnaires and via online google form to project managers and team members working in Pakistanis software houses. Participants were encouraged to be confident in the information they provided for this study. The questionnaire was divided in two main sections. At first, participants were requested to furnish their demographical information such as gender, age, qualification, and experience. In the later section, questions were asked about the study's variables including agile methodology, project success, team communication, and team empowerment. A five point Likert scale, ranging from strongly agree to strongly disagree has been used. A total of 350 questionnaires were distributed among project managers and team members in software houses. Out of which 260 questionnaires were received back. 34 questionnaires were not properly filled or have missing entries, which were not utilized further. A total of 226 questionnaires were used with a response rate of 64.57% for further analysis. The data represented that male respondent included (96.5%) and female respondents included (3.5%). 66.4% of respondents were holding of graduation degree along with an average job tenure in a software house was about 4 to 5 years. The respondents were relatively young with approx age between 25 to 30 years.

Instrumentation and measures

The scale for variables questionnaire was adopted from extant literature (Appendix-A). The questionnaire items included four variables including the independent variable - agile methodology, the dependent variable – project success, and two mediator variables i.e. team communication and team empowerment.

Agile methodology. The scale for agile methodology has been adopted from the research work of (Lu & Ramamurthy, 2011). All 7 items have been adopted. The sample questions of agile methodology are “we make prompt decisions in response to changing market trends”, and “we utilize our skill better in agile practices”.

Project success. The scale for PS has been adopted from the research work of Engelbrecht et al. (2017). All 6 items have been adopted. The sample question of PS is “the project was delivered within the allotted schedule and budgeted cost”.

Team communication. The scale for team communication has been adopted from the research work of (Roberts et al., 2004). All 6 items have been adopted. The sample questions of team communication are “team members have a provision to exhibit their viewpoint”, and “each person in a team listens to each individual's input”.

Team empowerment. The scale for team empowerment has been adopted from the research work of (Tomasi et al., 2015). All 6 items have been adopted. The sample question of team empowerment is “I have right to plan how to do assigned task”.

Assessment of common method bias

Common method bias (CMB) is a major source of measurement error in social sciences research, therefore we assessed CMB. The results of Exploratory Factor Analysis (EFA) revealed the highest percentage variance explained was 47.6%. Hence, if total variance of a single factor is <50%, this affirm that the data does not affect by CMB.

Data analysis procedure

For data analysis, IBM SPSS version 21 and Smart-PLS4 statistical packages were used. Several procedures were carried out during the data analysis process including the following:

1. Data entering and screening were done through IBM SPSS and filtered data were taken for data analysis.
2. The variables data reliability was tested through outer loading, Cronbach alpha, and composite reliability.
3. The convergent validity of the variables was tested using the average variance extracted.
4. The discriminant validity was tested through HTMT ratio.

5. Structural equation modeling was performed to determine the significant relationship among variables.
6. The preacher and Hayes method utilized to carrying out mediation and to find out the effect of mediators between independent and dependent variables.

Data analysis and results

Measurement model

We assess the measurement model in five ways which include: outer-loading, Cronbach alpha, composite reliability, convergent and discriminant validity (Table 2, 3). The normal threshold limit of outer-loading is >0.50 (Bagozzi and Yi, 1988; Gefen and Straub, 2005). All the items' outer loading lies within the prescribed limit however, one item of team communication (TC6) and one item from team empowerment (TE5) were removed due to low factor loadings. The composite reliability normal range of a construct is 0.7 (Bagozzi and Yi, 1988). The result shown all variables possessed higher composite reliability. Besides, Saunders, Lewis, and Thornhill (2009) stated that Cronbach alpha is a general method to assess the internal consistency of manifold items. Cronbach's coefficient alpha normal range of a variable is 0.7 (Nunnally, 1978). The results affirm that data reliability has been established through Cronbach's alpha.

Table 4.1: Factorloding, reliability, and validity

Variable (s)		Loading	Alpha	CR	AVE
Agile Methodology	AM1	0.704	0.848	0.884	0.522
	AM2	0.723			
	AM3	0.754			
	AM4	0.739			
	AM5	0.738			
	AM6	0.694			
	AM7	0.704			
Team Communication	TC1	0.837	0.876	0.910	0.671
	TC2	0.836			
	TC3	0.875			
	TC4	0.784			
	TC5	0.757			
Team Empowerment	TE1	0.816	0.888	0.918	0.691
	TE2	0.833			
	TE3	0.846			
	TE4	0.803			
	TE6	0.857			
Project Success	PS1	0.747	0.878	0.908	0.622
	PS2	0.819			
	PS3	0.807			
	PS4	0.814			
	PS5	0.745			
	PS6	0.798			

We measure convergent validity through average variance extracted (AVE) for whom the acceptable limit is 0.5 (Fornell and Larcker, 1981). Subsequently, all variables hold convergent validity. In order to examine discriminant validity, we analyzed the HTMT-ratio. According to Henseler, Ringle, and Sarstedt (2015) the acceptable limit of HTMT ratio is <0.9 and the relevant confidence interval-up is 1. Table 4.2 showed that HTMT values and confidence of interval values of each variable are <0.9 and 1, thus establishing convergent validity.

Table 4.2: HTMT ratio

Variable (s)	AM	PS	TC	TE
Agile methodology				
Project success	0.749			
Team communication	0.779	0.819		
Team empowerment	0.725	0.863	0.835	

AM: agile methodology; PS: project success; TC: team communication; TE: team empowerment

Structural model

For the present research study, the Structure Equation Model (SEM) is evaluated by the prescribed guidelines of (Hair et al., 2017). In the first phase, we evaluated the coefficient of determination (R^2) and the predictive relevance measure (Q^2). The results reflected that 66% (R^2 0.661) change was observed in project success, and 46% (R^2 0.460) and 40% (R^2 0.401) variances accounted in team communication and team empowerment respectively due to agile methodology which shows the model adequate predictive accuracy (Hair et al., 2017). Besides we measured Q^2 by using the blindfolding technique. The Q^2 value of project success, team communication, and team empowerment are 0.412, 0.450, and 0.386 respectively which are greater than zero, and subsequently characterize the robust predictive significance of the SEM framework (Hair et al., 2017).

Hypotheses testing

We evaluate hypotheses testing by analyzing the direct and mediating impact (table 4.3). H1 assessed whether agile PM methodology positively impact project success. The results affirmed that agile methodology has a positive influence on project success ($\beta = 0.185$, $t = 2.729$, $p < 0.003$), therefore H1 of the study supported. We assessed mediation analysis using two mediator variables (a) team communication and (b) team empowerment, between the relationship of predictor variable agile PM and criterion variable PS (H2 and H3). To ascertain the mediation result, we performed bootstrapping in Smart PLS-4. The result showed the indirect influence of agile PM methodology through team communication and team empowerment on project success was found significant (H2: $\beta = 0.175$, $t = 3.125$, $p < 0.001$ and H3: $\beta = 0.239$, $t = 5.112$, $p < 0.000$). The total effect of AM on PS was substantial ($\beta = 0.652$, $t = 11.868$, $p < 0.000$). With the inclusion of the mediators the effect of AM on PS still remain substantial ($\beta = 0.185$, $t = 2.729$, $p < 0.003$). This reflected complementary partial mediation, therefore H2 and H3 of the research supported.

Table 4.3: Direct and mediation analysis

	Std Beta	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P -Values	Decision
H1: AM->PS	0.185	0.068	2.729	0.003	Supported

	Total Effect			Direct Effect				Indirect Effect		
	Coeffi-cient	t value	p-value	Coeffi-cient	t value	p-value	Hypotheses	Coeffi-cient	t value	p-value
AM->PS	0.652	11.868	0.000	0.185	2.729	0.003	H2: AM->TC->PS	0.175	3.125	0.001
							H3: AM->TE->PS	0.293	5.112	0.000

AM: agile methodology; PS: project success; TC: team communication; TE: team empowerment

Discussion, conclusion, and implications

Discussion

The study aims to analyze the association between agile methodology, team communication, team empowerment, and project success. The significance of the proposed hypotheses confirms the resource-based view (RBV) and utilizes social identity theory (SIT). This study establishes positive influence of agile methodology on IT project success. The current result aligned with the findings of the extant investigation which support and witness the significant association between agile methodology and performance-centered outcomes (Confronto & Amaral, 2016; Gerster et al., 2018). This indicates that IT firms characterized by agile methodology can handle risk, take prompt decisions and become the source of project success. This advances the affirmation that in agile methodology, (a) the team is empowered, (b) team members have strong coordination (c) the team able to handle prompt changes. These features of an agile team generate more successful projects (Maruping et al., 2009).

This study affirms the affirmative effect of AM on PS. The outcomes established this hypothesized relationship. McAvoy and Butler (2009) argued that software companies better utilize agile practices so that is why agile projects are more successful. Research proves that the agile methodology provides more quality features that are directly associated to project success (Rolstadas et al., 2014). Agile methodology provides flexibility to the IT professional to implement required changes easily, this higher flexibility directly leads to project success (Cheng et al., 2009). Scholars like Confronto and Amaral (2016) highlighted that agile methodology is the only methodology that decreases the project complexity and leads it toward success. This affirms cogency of the Resource Based View that depict organizations as a collection of distinctive resources which serve as organizational strategy and sources of profitability (Barney, 1991) for instance agile framework (Stankovic et al., 2013). Hence, this endeavor found that agile PM methodology usage highly increased the likelihood of IT project success.

This study found a significant mediating impact of team communication in the relationship between agile and PS. The outcomes established this hypothesized relationship. The current result aligned with the findings of

the extant investigation which support and witness the significant mediating role of team communication. Marlow et al. (2018) establish a substantial impact of team communication in the relationship between agile methodology and PS. Hsu et al. (2012) argued that agile methodology is an efficient IT project management technique in which effective team communication increases the success rate of the project. The findings also affirms the validity of social identity theory (SIT). Hence, this study found that team communication enhanced the level of collaboration of the team in agile methodology due to which the project is implemented in a coordinated manner. Team communication in agile methodology builds strong cohesion between the team members which directly led the project toward success.

This study confirms the positive mediating impact of team empowerment in the relationship between agile method and project success. The outcomes established this hypothesized relationship. The current result aligned with the findings of the extant investigation which support and witness the significant mediating role of team empowerment (Annosi et al., 2016; Gerster et al., 2018; Suresh & Jaleel, 2015). Scholars like Gerster et al. (2018) argued that team empowerment is a contributing factor in agile methodology which is held in producing more successful IT projects. Team empowerment plays a significant role in the flexibility and innovation of agile projects (Annosi et al., 2016). In addition, Suresh and Jaleel (2015) stated that team empowerment and agile methodology are interrelated and both impact project management activities positively. This affirms the validity of social identity theory (SIT). The high level of team empowerment in agile methodology solves the problem that arises, takes appropriate decisions for a project, and executes the project on time and in the most successful manner (Dhir et al., 2019). Hence, this study found that project team members augment project success by utilizing their skills, talent, and abilities and by the support of empowerment from their agile leader.

Conclusion

This research highlighted imperious novel constructs, agile methodology, and team-related outcomes that pledge the project more successful. The study offered one of the earliest endeavors to establish the hypothesized framework that links agile methodology with project success by applying the mediating mechanism of team outcomes. This study highlighted the key elements of agile methodology as mediating variables including team communication and team empowerment to augment project success. The findings highlighted that agile methodology positively impacts IT project success whereas, team communication and team empowerment mediates this relationship. Hence, it is concluded that agile methodology plays an important role to accomplish the projects of software companies in Pakistan. It is also concluded from IT firms should empower their teams to takes effective decisions for efficient project management and success. Policymakers and agile leaders should develop a strategic plan for the smooth implementation of the agile model and provide a vibrant environment and empower the team to complete a project in a more effective modus.

Research implications

This endeavor highlights the theoretical and applied implications explored in the IT sectors of Pakistan. The outcomes affirm the role of agile framework in enlightening team communication and team empowerment and project success. Agile methodology eliminates project complexity through team communication and empowerment. The implementation of agile practices by IT managers not only advances their team-level outcomes using team communication and empowerment but also results in improving project success. This shows that firms should focus on agile practices which improve team outcomes by paying attention to professional growth, providing the team with a vibrant environment, and enriching team health, safety, and conduct within the firm. By doing this, IT firms might become in a superior stage to manage agile and team outcomes to prosper success.

Theoretical implication

This study significantly contributes to the theoretical understanding within the realm of IT industry. The outcomes emphasized the pivotal role of the agile framework in enhancing both team communication and team empowerment, subsequently lead to improved project success. The findings affirm that agile methodologies efficiently address project complexity by fostering vigorous team communication channels and empower team members. The research highlights how the implementation of agile practices by IT managers elevates team level outcomes and also contributes positively to augment overall project success. This insight adds depth to existing theoretical frameworks by considering the importance of agile method to foster effective communication and empower teams, thereby streamline project management processes.

Practical implication

From a practical perspective, this research offers valuable insights for IT firms working within Pakistan. It underscores the significance to adopt agile practices for enhanced team outcomes, particularly by focusing on professional growth, cultivate vibrant team environments, and nurture team health, safety, and conduct within the organization. The practical implications suggest that by prioritize these aspects, IT firms can efficiently manage agile method and leverage team outcomes to attain greater success. The implementation of agile method could position IT firms in a more advantageous stage, enable them to navigate project complexities effectively while foster an environment conducive to both individual and collective success. This practical guidance offers IT firms a roadmap to implement agile practices that improve team dynamics and significantly impact overall project success within the Pakistani IT landscape.

Limitation and future research directions

The research has a few limitations. At first, the data collected from personnel working in the IT sector of Pakistan, therefore, this framework should be applied in other contexts. The cross-sectional data-gathering approach was used in the present research while in future research longitudinal data-gathering techniques can be also valuable. This research was conducted on a relatively small number of respondents. In the future, number of participants should be enlarged. This study utilized team communication and team empowerment as mediators, future endeavors should include other team outcomes including team building, team identity, team commitment, team efficacy, and team performance as mediating variables between the relationship of AM and PS.

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Appendix-A (Questionnaire)

Agile Project Management Methodology

1. We implement appropriate decisions in the face of market/customer changes.
2. We constantly look for ways to reinvent/re-engineer our organization to better serve our marketplace.
3. We treat market-related changes and apparent chaos as opportunities to capitalize quickly.
4. We utilize our skills better in agile practices.
5. We fulfill demands for rapid response, and special requests of our customers whenever such demands arise, our customers have confidence in our ability.
6. We can quickly scale up or scale down our production/service levels to support fluctuations in demand from the market.
7. Whenever there is a disruption in supply from our suppliers we can quickly make necessary alternative arrangements and internal adjustments.

Team Communication

1. Everyone on the team has a chance to express their opinion.
2. Everyone in a team participates.
3. Everyone in a team listens to each individual's input.
4. Members feel free to make positive and negative comments.
5. Members of a team are comfortable with the roles that they play in the group.
6. Even though members do not have total agreement members do reach a kind of consensus that they all accept.

Team Empowerment

1. There was significant autonomy in determining how I do my job.
2. I could decide on my own how to go about doing my work.
3. I had a Considerable opportunity for independence.
4. The Impact on what happens in my project is large.
5. I had a great deal of control over what happened in my project.
6. I had a significant influence over what happened in my project.

Project Success

1. The project was implemented and used by the business.
2. The project was delivered within the allocated time.
3. The project was delivered within the budgeted cost.
4. The project was delivered within the agreed scope. Scope changes to be approved by the business.
5. The project achieved/realized the business expected commercial and user benefits as outlined in the business case.
6. The project was delivered according to the agreed quality.