ADOPTION OF AGILE METHODOLOGY FOR IMPROVING IT PROJECT PERFORMANCE

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Abstract

Most of the IT organizations are facing various challenges such as technological advancement, new customer requirements, merger & acquisition, and changing market demands, which should be addressed to survive in the industry. For enhancing more value to the customer in the project, the best option is to choose Agile Methodology for managing the project, which helps to accommodate the ad-hoc business requirement than pre-planned. Though, most of the organization, especially in the IT industry is shifting to Agile methodology practice, which helps to enjoy the benefit of better collaboration and customer experience. The study was conducted among 404 IT professionals from the IT corridors of India to understand the influence of Agile methodology on IT project performance. Most responses received from people who have sound experience in IT project management which assures the quality of results obtained. From study, it has been found that Agile methodology (β= 0.630, p<0.00) has a significant and positive impact on the project performance. Also, the study proves that people who are working in Scrum framework (Agile methodology) improves the project quality as well as business value. Based on Stepwise regression results, Product ownership has higher degree of importance than other independent variable for the individual work performance which solidifies the requirement for software development. Multicollinearity Assessment shows Product Ownership and Development Practice have more impact on project performance than Team considered for the study. Previous studies didn't cover the aspect as well as areas proposed in this study to arrive the conclusion of Scrum framework for project performance, and it opens the pathway for future research work.

Keywords: scrum, agile methodology, project performance, adoption

1. INTRODUCTION

As per Project Management Institute (PMI), a Project is well-defined as the temporary endeavor for creating a unique product, result, or service (PMBOK® guide,

2017). Earlier, the traditional software development cycle used was the Waterfall Model for managing IT projects. It is employed when the requirements are very clear. For an ever-changing market for consumer demand and complex requirements, the employment of traditional waterfall model for the project is a failure. Therefore, the introduction of Agile methodology in software development cycle helps address those open issues from the traditional project management models. Agile software development processes are used primarily to support the development of working software in a flexible, adaptable, and scalable working environment through frequent iterations (I-Link, 2017).

The study was conducted to measure the adoption of Agile methodology for improving the IT project performance. For completing the study, the researcher connected with IT professionals across South India region. As stated earlier, the IT organizations are switching to the practice of Agile Methodology to meet the ever-changing demand of the market. Most of the IT companies work from the South India region, so the sample population of this region was considered for this research study. Also, the adoption of Agile methodology shows the trend that people are shifting from experiencing traditional project management models to build flexibility in the work environment.

1.1. Objective

The application of project management has grown considerably in different sectors like Construction, IT and Banking, etc. across the globe thru last years. The main key point of project management is transforming or managing the most complex and unpredictable situation of a project in a predictable, efficient, and effective way. The project can define as the set of tasks which should be completed on time and within budget to meet its goals (Klastorin, 2004). Project management views are different for theoretical and practical scenarios while comparing with other business processes (Hall, 2012). Theoretical scenarios focus on managing the resource constraints while Practical views were defined to complete the project within the agreed budget and on scheduled time. Many of the ancient human endeavors considered as a project, but the formal project management approach started when the US entered the Second World War in which Department of Defense requires to meet the emerging complexities when Cold War started (Carayannis et al., 2005). During this time, the US Government appointed a single person called project manager who should be responsible for managing the task for completing the final. The study was conducted to fulfill the following objectives:

• To evaluate the adoption Agile methodology based on Scrum framework by software professionals for Project performance.

• To measure the influence of Scrum dimensions for the IT project performance

• To gauge the correlation of age factor for the IT project performance

2. LITERATURE REVIEW

2.1. IT Industry

Nowadays, technology is cardinal in driving the world as a part of economic change, social change, and industrial advancement. Information Technology (IT) had proven no exception from the parent by

making advancements and more results for reducing the complexity. The application of IT influences every industry globally for daily operations. It creates an opportunity or a service for people to connect or communicate at any point in time. Nowadays, work is shifted from one place to another based on their availability. For example, the fortune 500 companies like Microsoft, IBM etc. have distributed the work across the world which assures the continuity in operation and creates more job opportunities. From SearchDataCentre (Data Center information), IT is defined as the use of computer, software, and hardware to create process, store, and exchange electronic data. From historical information, it has found that IT has evolved through four stages of development era (History Of Information Technology).

2.2. Project Management

Project Management is a key element for the company's growth and ultimate success regardless of industry. Similarly, the project manager is the key person who should manage the project and be a single point of contact at any time. Recently, KPMG surveyed about the leading project management methodologies practicing across different industries, say 20, in New Zealand to give more insight into project management practice as such (Barlow et al., 2017).

The information in figure 1 has also shown the trend of leading project management methodologies practicing globally.

2.3. Agile Framework-Scrum

Scrum is a simple framework used for managing and controlling the process of product development in a complex environment to meet business requirements. It has required to produce effective team collaboration for project work. The framework is designed to accommodate three to nine resources for development by which they can define and divide into a small task for completing the task in timeboxed iterations, say two to three weeks, called sprint. For managing the multiple teams, the
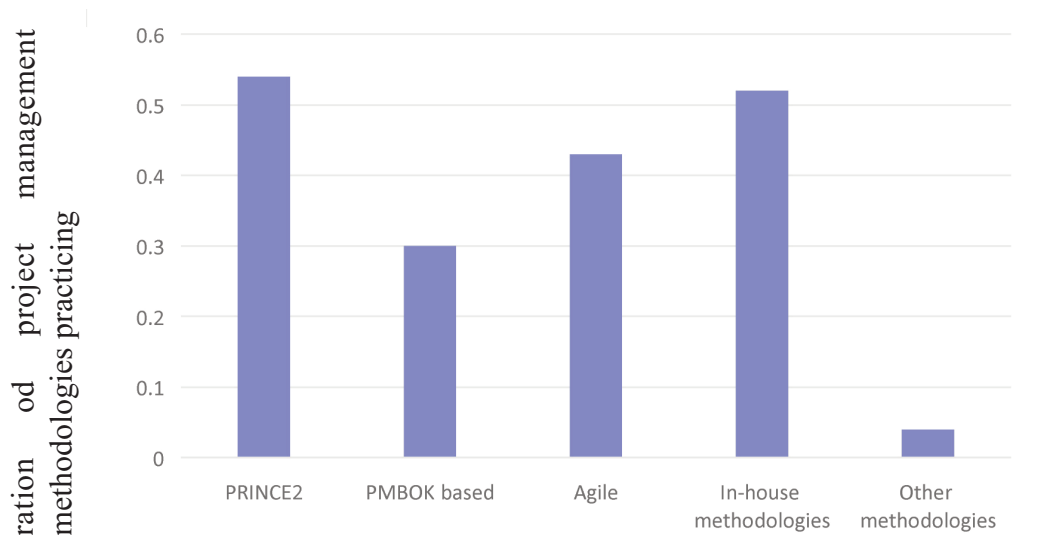

Figure 1. Distribution of project management methodology. Data Source: Barlow, et al. (2017)

framework such as SAFe, Large Scale Scrum, or Scrum of Scrum has to use in larger organizations.

Figure 2 shows the iterative process followed in the Scrum framework for completing the work. Moreover, it is important to elaborate on the roles associated with Scrum to define the action/task performed during the work. Product Owner, Scrum Master, and Development Team are the three primary roles of Scrum framework who would handle major activities of the Scrum project.

2.4. Project Performance

Currently, every organization is focusing on evaluating the project performance from individuals' angle. There are a lot of studies to measure the individual performance but specific ones to measure projects based on project management are very limited. The research topic is framed to analyze the performance of resources from project who are currently practicing with Agile methodology through the profession. While the concept of the project management is to organize and manage the project in a systematic way to make the employee more productive as possible. During 1998, Shenhar and Dvir have conducted a study to know the project success factors along with project natural classification (Dvir et al., 1998). Based on the study among 110 projects, they have concluded two success dimensions of projects are meeting project goals and customer benefits (Dvir et al., 1998).While Shenhar and Dvir did another study in 2001, which in turns to develop new dimensions of project success (Shenhar et al., 2001). Moreover, they didn't consider the previous dimensions used such as meeting project goals for the benefits to the customer. Following contributions were used for defining the new two success dimensions of the project:

• Project is part of the organizational strategy and wholly aligned with short or long objectives

• Identification of specific dimension for project success as the project is a multi-dimensional concept.
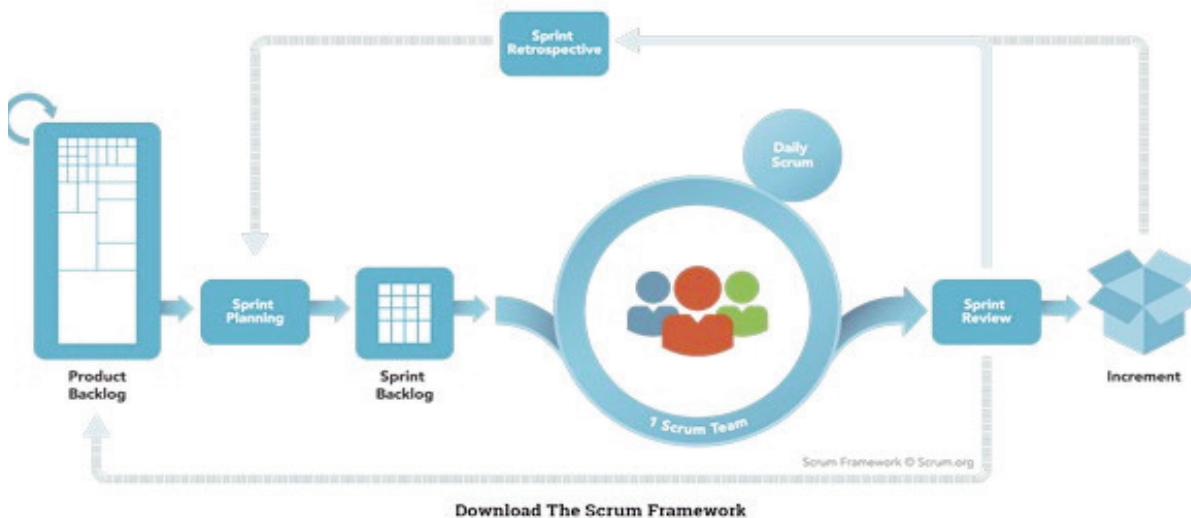

Figure 2. Scrum framework

Source: The Scrum Framework, Scrum,2018 (https://scrumorg-website-prod.s3.amazonaws.com/drupal/inline-images/2017-05/ScrumFrameworkTest.png)
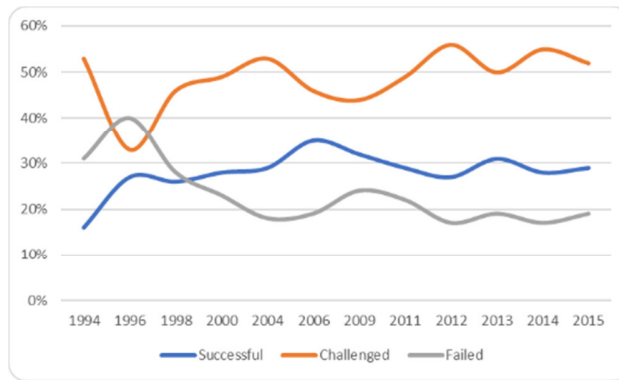
Figure 3. IT project performance from 1994-2015 by Chaos Report Statics. Adapted from Joseph et al. (2016)

2.5. IT Project Performance Report

Earlier, the study conducted by Standish Group published Chaos report in 2015 about the success factors of software projects. They have published the report since 1994, which provides a snapshot of the software industry. It considered around 50,000 projects globally for the study, which ranges from small enhancement to massive re-engineering projects.

The performance of IT projects for two decades (Joseph et al., 2016) has depicted in Figure 3. Indeed, the history of successful project numbers has increased progressively from 1994 to 2006; however, the rate is inconsistent for the remaining period. The report shows the failed projects reached the highest point in 1996 and then after it decreased in number due to the maturity in IT process and methodology. But the challenging projects have been addressed in
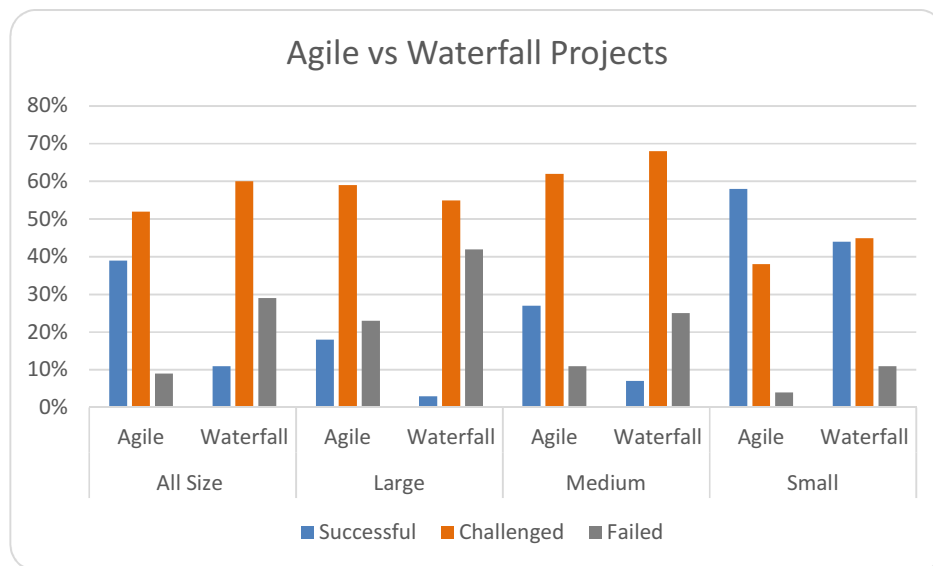

Figure 4. Resolution of all software project from CHAOS databased FY 2011-15. Adapted from CHAOS 2015 report

differently, and figures were mostly above the successful and failed projects. Together with they have made the comparison of Waterfall and Agile model projects across all sizes of project.

The analysis has shown in Figure 4 provides a comparison of successful, challenged, and failed projects in different project sizes from 2011-15. It is interesting that the Agile project has a success rate of 39% than Waterfall models, 11% across all size categories. However, the challenged projects for the Waterfall model are 60%, and Agile is 52%. Likewise, the failed project is also higher for the Waterfall model is 29% than Agile model is 9%.

A further explorative study is required to bring more clarity in IT project success. From the analysis, Agile methodology plays a key role in improving project performance. Moreover, the benefits of Agile methodology in IT projects is narrated in the above section. Finally, the 2015 CHAOS report also provides support for Agile methodology in superiority over project performance. Although the studies conducted by Misra et al. (2009), Drury-Grogan (2014), and

Serrador and Pinto (2015) concludes that Agile methodology has a good influence on IT project success; however, the study is very minimal for the Indian context.

3. METHODS

3.1. Approach and Methodology

This study was conducted to evaluate the adoption of Agile methodology in software projects. So, the analysis was focused on examining the Agility of software professionals based on Scrum Framework. The other areas considered for the study were to identify the influence of Agile methodology on the performance of individuals in the project work. For that, the defined framework was used to find the capability or outcomes of resources in different directions for the project performance.

The research formulated to gain insight into IT projects based on the Indian context. There were no studies conducted earlier to examine the adoption of Scrum framework
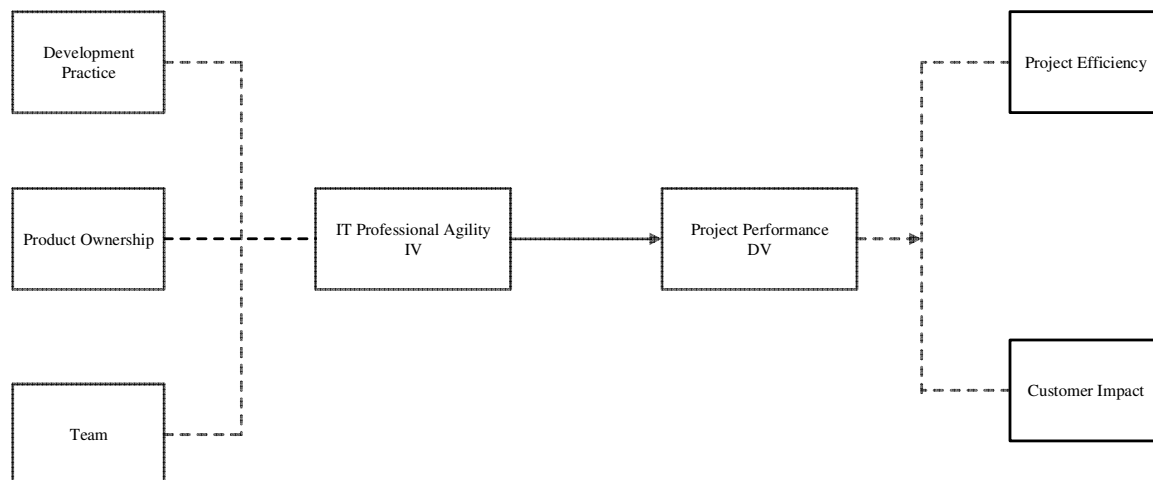

Figure 5. Conceptual Model for DV and IV

part of the Agile methodology in IT projects and its contribution towards the project performance of individuals. For completing the study, a research was conducted among software professionals who have experience in Agile methodology. Some of the geographic locations considered for the research in South India were Bangalore, Hyderabad, Chennai and Cochin & Trivandrum.

The descriptive study was used to gain new insight into the work. It also helped in adding more value to the previous research works that ended up with incomplete information. This study used to conduct the characteristics of individuals or a group of people related to the research topic. Most of the management or social type of research are laying under this category. Research design was planned very carefully to get accurate information. Hence, the best practice followed is to place the measures to avoid the bias response from respondents which can maximize the reliability and economic viability of the study. Following statement mentioned the key importance of the descriptive research:

• Participants are observed in the unchanged environment

• Created the opportunity to explore the topic into a new area as part of technological advancement

• Multifaceted approach used for qualitative and quantitative data analysis

• Results are generated from rich data collected.

This session discusses the conceptual model developed for the study. Figure 5 illustrates that each dimensional factor associated with Independent and Dependent variables used while establishing the hypothesis for the study.

3.2. Independent Variable

Here, the independent variable is considered to measure the agility of software professionals specific to Scrum framework. There are two dimensions considered while measuring the agility of software professionals.

• Development Practice (Table 1)

It deals with best practices used in Agile methodology with specific reference to Scrum Framework. As stated by Overeem the key purpose of Scrum is to create usable, done, and potential releasable increments (Sekaran & Bougie, 2016). Moreover, it covers the best practices, such as scrum ceremonies, policies & procedures, and approaches towards the work development is measured.

• Product Ownership (Table 2)

One of the key stakeholders of scrum project is Product Owner. They used to build the vision of the product and convey to the scrum team, which helped to bring everyone on the same page.

They demand to prioritize the product backlog and ensure to keep the quality of work. All these scenarios were considered while measuring the product ownership role followed in the scrum project.

• Team (Table 3)

Generally, Scrum specifies three main roles of the team, such as Product Owner, Scrum Master, and Development team. Those people should be self-manageable, cross-functional, long-lived, co-located, and dedicated to work.

3.3. Dependent Variable

The metric used in the study was to measure the influence of scrum framework on the individual work performance of

software professional with specific to the project. For measuring the project performance, the model developed by Shenhar and Dvir was adopted as the dependent variable (Moraes, 2013).

• Project Efficiency (Table 4)

It measures the key KPIs, such as, deadlines, and budget of any project. Nowadays, it is visible for the team to ensure the transparency and integrity towards the work.

• Customer Impact (Table 5)

Again, it adds the value towards the product quality and improving customer satisfaction from work. Those questions were created as part of the self-assessment of

professionals for achieving the same.

3.4. Hypothesis Development

Following hypothesis were created based on the research objectives and related questions posted in Chapter 1:

a. To measure the adoption of Agile methodology based on scrum framework for improving IT project performance

H_{0ID}: There is no significant relationship between Agile methodology adoption and IT Project performance

H_{1ID}: There is significant relationship

Table 1. Dimensions of Development Practice

Sl No	Development Practice
DP1	I am empowered for decision making in scrum project.
DP2	Sprint review happens at every sprint closure
DP3	Sprint retrospective happens with team at the end of every iteration
DP4	Effective and adequate code review practices are followed in each sprint
DP5	All designs are simple and incremental
DP6	Positive review of sprint retrospective is beneficial for next sprint quality
DP7	Daily scrum limits to 3 general questions to team
DP8	Agile Team self-polices are reinforced by the use of Scrum framework
DP9	Board displays the sprint goals clearly
DP10	Commitments are met by each release
DP11	All changes are accommodated in sprint
DP12	There is no disruption for team in sprint
DP13	I am self-organizer for meeting the project goals

Source: Developed for the research

Table 2. Dimensions of Product Ownership

Sl No	Product Ownership
PO1	I know who the product owner of the project is
PO2	Delivery Team has Definition of Done for product backlog items (PBIs) that is followed
PO3	Product Owner is associated with every sprint
PO4	Product backlog is prioritized by PO while collaborating directly with business
PO5	It is very clear about the goals of each sprint/iteration

Source: Developed for the research

between Agile methodology adoption and IT Project performance

b. To quantify the influence of Age on the relationship between Agile Adoption and Individual project performance.

H_{0A}: There is no significant relationship between scrum framework and individual performance of Software professionals working in Information Technology Sector with Age

H_{1A}: There is significant relationship between scrum framework and individual performance of Software professionals

working in Information Technology Sector with Age.

c. To evaluate the influence of Scrum framework dimensions such as Development Practice, Product Ownership and Team, on Individual work performance related to the IT projects.

H_{0IV}: There is no significant relationship between the dimensions of scrum framework and individual performance of Software professionals working in Information Technology Sector.

H_{1IV1}: There is a significant relationship

Table 3. Dimensions of Team

Sl No	Team
T1	Team members are included in requirement workshops for each sprint
T2	Scrum team is always less than 10 people
T3	Scrum team is co-located
T4	Team is aware of velocity of sprint
T5	Team uses story point for estimating each feature size in sprint
T6	Team creates the estimation for backlog items
T7	Less importance for documentation and risk management is followed in the sprint

Source: Developed for the research

Table 4. Dimensions of Project Efficiency

Sl No	Project Efficiency
PE1	I was able to deliver the project scope within the budget
PE2	Most of the project were completed within the planned time

Source: Developed for the research

Table 5. Dimensions of Customer Impact

Sl No	Customer Impact
CI1	I have met the appropriate level of functional performance in work
CI2	My work delivered the technical specification of the design
CI3	The customer needs were met from my work
CI4	I resolved the customer issues in the project
CI5	My project or services used by the customer
CI6	My work contributed to achieve the customer satisfaction

Source: Developed for the research

between Development practice of scrum framework and individual performance of Software professionals working in Information Technology Sector.

H_{1IV2}: There is a significant relationship between Product Ownership of scrum framework and individual performance of Software professionals working in Information Technology Sector.

H_{1IV3}: There is a significant relationship between Team of scrum framework and individual performance of Software professionals working in Information Technology Sector.

4. RESULT AND DISCUSSION

4.1. Data Collection

The final questionnaire was developed through the refinement of the pilot study conducted. For measuring the Agility, the questions were created from various online platforms, such as 101 ways by Kelly Waters (Waters, n.d.), Cape Project Management (Tousignant, n.d.), SAFe (Scaled agile, n.d.), Scrum (Open Assessments, n.d.) and association with Agile Experts. Researcher adopted the performance evaluation model developed by Shenhar and Dvir for the

dependent variable and formulated the questions with required dimensions (Moraes, 2013). After confirming the survey instrument with the expert committee, it has been circulated among 25 professionals for pilot study. Most of the feedback received from the resources during pilot phase were the professionals in Agile methodology which could assure the quality of the feedback. From the feedback, most of them mentioned the survey is lengthy due to number of questions however finally all of them agreed while describing the scope of work. Again, they advised to reformat to bring a good language to the questions which help researcher to build quality questions by working with Agile experts prior to the survey rollout.

4.2. Analysis

Table 6 depicts the distribution of participants by age group. It was found that the majority of response received from 40-45 years (33.2%) and following that 34-39 years (27.7%) group responded. Then the responses were received from the young age group in the range of 28-33 years was (22.8%), and 22-27 years (12.9%) respectively. The least responses were received from the higher age group of 46-51 years (3.2%), and 52-57 (0.2%). Here, the most important highlight is that the middle

Table 6. Age Group

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	22-27	52	12.9	12.9	12.9
	28-33	92	22.8	22.8	35.6
	34-39	112	27.7	27.7	63.4
	40-45	134	33.2	33.2	96.5
	46-51	13	3.2	3.2	99.8
	52-57	1	.2	.2	100.0
	Total	404	100.0	100.0	

Source: Developed for the research

age group is responded more to the survey and that would improve the quality of feedback from experience. However, there was no hard rule set to collect the information from the specific group but taking responses from multiple age groups is important to gain the insight of Software professionals' agility and how much it influences the project performance.

Here, the researcher used Cronbach's alpha technique for measuring internal consistency, which shows how items were closely related or grouped. Moreover, this technique is used extensively for measuring reliability (Field, 2013). As stated by Saunders and associates, the accepted cut off value of Cronbach's alpha coefficient is 0.70 to ensure the reliability acceptance (Saunders et al., 2012). But for the exploratory research or previous studies, the alpha value should be lower (Sekaran & Bougie, 2016). Likewise, the coefficient is lower for the scale with lower than ten items (Hair et al., 2014). For

that case, the reliability can be accepted if the coefficient is less than .60 (Nunnally, 1978; Tabachnick & Fidell, 2007; Hair et al., 2014).

Table 7 provides the Cronbach's alpha calculated from the questionnaire before and after survey rolls out using IBM SPSS 20 for reliability analysis.

After completing the data cleansing, there were a total of 404 participants who have provided the valid responses in Table 8. Interestingly, the researcher was able to attain the uniformity in the number of responses in each location around 25%. This would reduce the bias response to any specific area which may have more expertise in Agility and create balance in the work output. Bangalore is the Silicon Valley of India, so there is the possibility of more IT professionals, especially in Agile practice, would be available for the survey. Nowadays, IT Industries expanded across other parts of South India, such as

Table 7. Cronbach Coefficient- Pre-Survey

Particulars	Items	Cronbach's alpha-Pre-Survey	Post -Survey
Agility			
Development Practice	13	0.821	0.78
Product Ownership	5	0.805	0.86
Team	7	0.734	0.90
Project Performance			
Project Efficiency	2	0.714	0.90
Customer Impact	6	0.826	0.76

Source: Developed for the research

Table 8. Working Location

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bangalore	102	25.2	25.2	25.2
	Chennai	100	24.8	24.8	50.0
	Cochin / Trivandrum	101	25.0	25.0	75.0
	Hyderabad	101	25.0	25.0	100.0
	Total	**404**	**100.0**	**100.0**	

Source: Developed for the research

Hyderabad, Chennai, Cochin, and Trivandrum. That's why the research topic was designed to gain the support of IT professional to evaluate the agility and project performance.

4.3. CFA (Confirmatory Factor Analysis)

CFA is a type of Structural Equation Modeling which establishes the relationship between observed variables and latent variables or factors (Tabachnick & Fidell, 2007). The convergent validity, construct validity, and unidimensionality were evaluated for the study by performing CFA models. Moreover, the analysis extended towards the independent and dependent variables to assure the quality of the relationship between latent variables with observed variables. The pragmatic and hypothetical contexts were considered for building the CFA measurement model. Also, the study extends to measure the goodness-of-fit of the model proposed along with other parameters such as normal chi-square test, SRMR, NNFI, CFI, GFI, AGFI, and RMSEA to assure the validity.

4.4. Independent Variable- Agile Framework

The second-order CFA model demonstrates the Agile Framework (AF) constructs. It contains three factors or latent which decreed as exogenous variables and the observed variables endorsed as endogenous variables, which have 26 items spread through three dimensions namely as Development Practice (DP), Product Ownership(PO) and Team (T) , and each observed or showed variables accounted for error which also considered as latent. In addition, the relationship among the exogenous latent was considered while computing the model. The connection among latent and manifested variables or items is reflective indicators, which showed the single-headed arrow from latent to manifested, latent are represented by spherical and observed items represented in rectangle, as a matter of course, regression weight of 1 shown in dotted lines in the diagram.

The goodness-of-fit indices received from the Agile framework model analysis as follows: normal chi-square value (χ^2/df)=2.16, SRMR=0.057, GFI=0.893, TLI=0.924, NNFI=0.924, CFI=0.947 and RMSEA=.08. All these values were laying under the acceptable limit and considered to be a good fit model for further analysis (Hooper, 2008; Kline, 2011). So, these indices confirm the CFA output which has statistical validation for the theoretical structure of Agile Framework.

4.5. SEM (Structural Equation Modeling)

MLE(Maximum Likelihood Estimation) method utilized for evaluating the SEM model developed as it was the most demanding when multivariate normality assumption is attained for the study.

The two-stage process of modeling is done for performing SEM analysis, as recommended by several scholars (Hair, 1998; Lin , 2004) according to which CFA is tested before structural model testing. The first advantage of SEM is to manage the relationship between variables concurrently, and multiple regression study is not supportive of the fact. Secondly, the SEM helps to evaluate the relationship between latent and observed variables (Hoyle, 1995;

Schaupp, 2010) and matured the system to move into CFA from exploratory type study. Lastly, SEM is used to build the model and is able to differentiate the measurement error while doing the analysis that was not possible in an earlier observed model of estimation (Kline, 2011; Prajogo, 2009). The SEM approach can be utilized to explore the data that was beyond multiple regression model. Finally, it concludes that the best approach used for obtaining the proper conclusion from research framework is SEM. Many researchers endorsed performing a detailed study about the expectations of multivariate analysis before jumping into SEM approach in research work.

4.6. Relationship between Agile Methodology and Project Performance

There were three dimensions or latent constructs developed for measuring the agility of software professionals, and each construct should have 5-15 items. Similarly, the two dimensions were created to measure

project performance, which has 2-8 items on each construct. Based on Research Objective 2 (RO2), CFA with a second order study in Figure 6 conducted to examine the relationship between the agility of software professionals based on the Scrum framework and influence on project performance.

From the previous study, Kline recommended the other five types of goodness-of-fit measures other than chi-square statistics has been preferred to gauge CFA's model fit (Kline, 2011). So, those measures are CFI, GFI, AGFI, RMSEA, SRMR, and NFI was utilized for this research. Chi-square should be less than three while others like AGFI, GFI, CFI, and NFI must be minimum of .90 for the acceptable model. Similarly, RMSEA should be less than .08 and SRMR less than .10 for a perfect fit. The developed model meets the satisfactory requirement of statistical requirement as mentioned for the structural and measurement model. While evaluating the dimensions or latent constructs, all variables were able to meet the minimum factor loadings (>.70) as
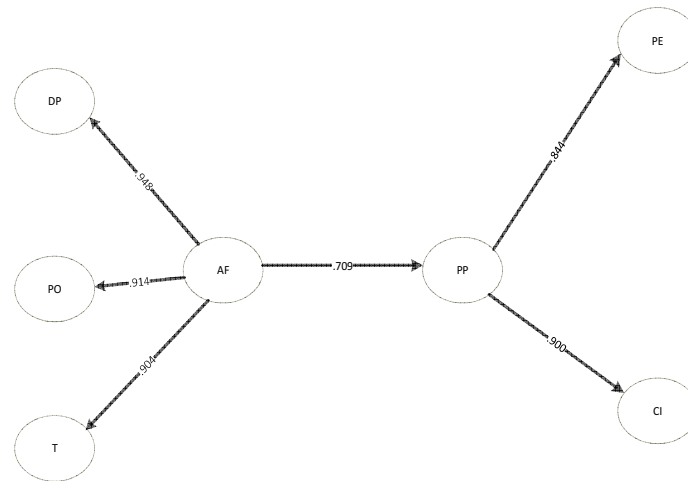

Figure 6. Structural Equation Model of Agile Framework and Project Performance.
DP=Development Practice, PO=Product Ownership, T=Team, , PE= Project Efficiency, CI=
Customer Impact.

recommended for each construct. So, the model considered being statistically significant when *p*-value <.01.

From the analysis of the structural model developed for the study, it has notified that the professionals who are working on the Scrum framework should impact the individual work performance at project level positively (Figure 6).

4.7. Testing Hypothesis of Agile Framework and Project Performance (H_{0ID} / H_{1ID})

For validating the hypothesis, it must test the significance of parameter values of each path. Table 9 depicts that Agility framework (β=0.630, *p*<0.00) has a positive and significant relationship with project performance. Therefore, the hypothesis of H_{1ID} is accepted. Again, the study shows

that the benefits of scrum framework achieved to project only by aligning with policies defined in the framework for the project and get the full support from management.

4.8. Relationship between the dimensions of Scrum framework and the influence of improving Individual work performance

The stepwise regression model result illustrates in Table 10 to weight the significance of two independent variables for improving the individual work performance. It has followed the results gained from the standardized regression model, and t value shows the independent variable has performed good work to improve the project performance at the individual level. Product ownership has higher importance than other independent variables to improve the

Table 9. Regression between Agile Framework and Project Performance

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all	Remarks
PP ~ AF	0.63	0.133	4.74	0.00	0.709	0.709	H_{1ID} accepted

PP= Project Performance, AF=Agile Framework. Source: Developed for the research

Table 10. Stepwise Regression Result

Steps	Predictors [a]	Unstandardized Coefficients		Standardized Coefficients	R^2	Adjusted R^2	t	*p* value
		B	S. E	β				
1	DP	.60	.06	.62	.39	.37	6.92	0.00*
2	DP	.43	.07	.50	.48	.47	8.24	0.00*
	PO	.40	.06	.43			7.68	

[a] Dependent variable= Individual Project Performance, *significant at .05. DP=Development Practice, PO=Product Ownership, PE= Project Efficiency, CI= Customer Impact, Source: Developed for the research

Table 11. Multicollinearity Assessment

Predictors	Collinearity Statistics	
	Tolerance	VIF
Development Practice	.221	4.52
Product Ownership	.315	3.17

Source: Developed for the research

individual project performance as the job demands the requirements should be clear for every sprint. In addition to this, R-value of .482 and adjusted R square of .475 of Stepwise regression from table 10 depicts that there is a positive and significant relationship between Independent and Dependent variable where p<.05. Besides, the independent variable (Development Practice, Product Ownership,) explained 47% of the variance in Individual Project performance. Based on this result, it can be concluded that the relationship between Agile framework and Project performance is significant.

4.9. Interpretation of regression variate

The multicollinearity of the independent variable is the crucial challenge for inferring the regression variate. The collinearity of the data can be verified from the correlation matrix and any correlation value above 0.90 is considered to be the first sign of collinearity (Hair et al., 1998). Table 11 shows that the highest correlation that exists between Development practice and Product Ownership is 0.82 within the threshold limit. Tolerance Value and VIF (Variance Inflation Factor) were other types of analysis performed to identify multicollinearity in the multiple regression. The changeability of the independent variable, which wasn't identified by other independent variable, is called Tolerance value. The lower tolerance value might create high collinearity of independent variables, so it recommends having a minimum cut of .10 for tolerance value where VIF is above 10 (Hair et al., 1998).

All the test has completed validating the regression variate to confirm the hypothesis proposed for the study. The following equation has been created from this study to influence the individual project performance by practicing Scrum framework in the project.

$$Y = \beta o + \beta 1 X1 + \beta 2 X2$$

Y= Individual Project Performance
β= Regression Coefficient
X1=Development Practice
X2= Product Ownership

Finally, Y = 36.876 + .32*Development practice + .34*Product Ownership

Table 12. Result of Hypothesis Testing

Hypothesis	Path	Unstandardized Coefficients		Standardized Coefficients	Critical Ratio (t-value)	p value	Remarks
		B	S. E	β			
H_{1IV1}	DP→PP	.166	.092	.090	4.84	.000*	Supported
H_{1IV2}	PO→PP	.615	.569	.546	3.90	.000*	Supported
H_{1IV3}	T →PP	-.689	.466	-.232	-1.47	.143	Not Supported

*DP= Development Practice; PO=Product Ownership; T=Team; PP=Project Performance. Source: Developed for the research

Table 13. Relationship between Agile Framework and Project Performance after controlling Age

Variables	Mean	SD	*R1*
Agile Framework (AF)	22.53	19.81	
Project Performance (PP)	4.72	3.56	.639*

*p<.01,r1= correlation between AF and PF while controlling Age. Source: Developed for the research

This equation can interpret as follows,

• One unit increase in Development Practice would increase .32 unit increase in Individual Project Performance. Therefore, H1IV1 hypothesis is accepted.

• One unit increase in Product Ownership would increase .34 unit increase in Individual Project Performance. Therefore, H_{1IV2} hypothesis is accepted.

These two independent variables explained 47% of the variation in Individual Project Performance.

Table 12 shows the summarized result of hypothesis considered for testing each dimension of Agile framework to measure the influence on project performance at the individual level. The result has derived from the output in Table 12 and concludes that Development Practice and Product Ownership has a positive and significant impact on project performance improvement. Further, Team have no significance for influencing the project performance.

4.10. Influence of Age factor on the relationship of Agile framework and project performance

Partial Correlation has been conducted to control the influence of Age which might be a perplexing or smothering variable and have any impact on the relationship between Agile Framework and Project performance as stated in the previous chapter. If the connection between two factors of curiosity diminished after removing the impact of the third factor, then it is conceivable that the relationship between two factors is evident; however, not substantial.

Table 13 shows the output of partial correlation conducted, and the independent variable considered as a control variable.

Besides, the relationship between Agile framework based on the Scrum framework and individual project performance was tested separately and stated in the separate table.

Firstly, it was found that Agile experience has a positive and significant relationship with Agile framework and project performance (r=.639, p<.05), and so the hypothesis H_{1A} accepted. The study covered only a few dimensions of the Scrum framework that is very important in the project management domain. All these practices have ensured that Scrum framework must create or improve the project efficiency at the individual level which is a positive alarm for the organization to continue and evangelize scrum framework across the different projects based on adaptability.

5. CONCLUSION

From the analysis, it was found that the adoption of agile methodology will definitely improve the project performance. This was proven by the first hypothesis. For creating the first hypothesis, there has been a thorough study conducted by referring to the literature and published resources to gain more insight into Agile methodology and selecting the Scrum framework. The questionnaire for measuring the Agility was prepared after consulting the expert committee of professionals who are practicing in the Agile methodology domain for a long time, which gives more precision towards the end goal. But the Scrum framework dimensions such as Development Practice & Product Ownership is only supporting the project performance which mentioned in the second hypothesis. The

Scrum consists of mainly dev team, scrum master and scrum product owner (Scrum Roles - The Scrum Team, 2018). There are some defined measures used to follow in each Sprint like the team should be available during sprint ceremonies to bring everyone on the same page before starting the project. The key point of scrum development practice is individuals empowered to decide what can or can't deliver within the stipulated time. Besides, all the processes of Agile methodology are incremental, which means the project starts with an initial requirement that can mature while progressing the project. So, the individual should be self- organized to attain the scrum benefits in work. The Product owner (PO) is working mainly with stakeholders for collecting the requirements and prepare the product backlogs for driving the project. This role motivates the team with the prioritized backlog and elevates any ambiguity of product or project goal. The product backlog usually prioritizes during sprint planning meeting by PO. Team must be collocated with a maximum of ten members. More importance was given to deliver the features iteratively. Traditional Waterfall IT projects have more importance for documentation and risk management through end to end process, but it has less importance in Agile methodology. From the analysis, it was found that most of the participants were working in different locations as part of global projects. So, it won't support the condition of the collocated team for Agile work. Finally, the third hypothesis has a positive influence on the Scrum framework in improving the project performance at the individual level while looking at the age factors. People who started the agile practice in early stages of career development could help others to follow the principle in the best manner as stated.

6. LIMITATION

Time and Resources constraints were accepted as one of the restrictions to complete the study. The study was conducted among software professionals in India, especially to Bangalore, Hyderabad, Chennai, and Cochin/Trivandrum. The key findings of the research extended to professionals globally who are working in Agile methodology might give new insight into the relationship of Agile methodology and its influence on project performance.

The researcher using cross-sectional data for the analysis than longitudinal research is another weakness of the study. Time constraint is the factor that limited in conducting multiple data analysis. The data collected at a different time can test the connection between variables. So, the future research can be planned with sufficient time to avoid the uncertainties by doing the longitudinal study. From studies, many researchers identified that the questionnaire survey is the cost-effective way of collecting the sample and consistent data. However, it may not be able to give the idea behind some questions even if justify along with questions has received the bias responses. So, it is recommended to spend most time with participants to address doubts regarding the questionnaire. Moreover, the response received from higher leadership might not consider the ground realities of projects in Agile methodology. The three dimensions were considered for measuring the agility of software professionals for completing the study. The study can expand to other areas of Agile methodology by adding more

dimensions relevant to the Scrum model and open the space for future research. Lastly, the scope of the Scrum model is limited to this study.

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УСВАЈАЊЕ АГИЛНЕ МЕТОДОЛОГИЈЕ ЗА ПОБОЉШАЊЕ ПЕРФОРМАНСИ ИТ ПРОЈЕКТА

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Извод

Већина ИТ организација се суочава са различитим изазовима као што су технолошки напредак, нови захтеви купаца, спајање и аквизиција, и променљиви захтеви тржишта, на које треба обратити пажњу да би опстали у индустрији. За повећање вредности за клијента у пројекту, најбоља опција је одабрати Агилну методологију за управљање пројектом, која помаже да се пре испуне ад-хок пословни захтеви него унапред планирани. Заиста, већина организација, посебно у ИТ индустрији, прелази на праксу Агилен методологије, што помаже да се ужива у предностима боље сарадње и бољег корисничког искуства. Студија је спроведена међу 404 ИТ стручњака из ИТ коридора Индије да би се разумео утицај Агилне методологије на перформансе ИТ пројеката. Већина одговора је добијена од људи који имају велико искуство у управљању ИТ пројектима што осигурава квалитет добијених резултата. Из студије је утврђено да Агилна методологија (β= 0,630, p<0,00) има значајан и позитиван утицај на перформансе пројекта. Такође, студија доказује да људи који раде у Скрум оквиру (Агилна методологија) побољшавају квалитет пројекта као и пословну вредност. На основу резултата постепене регресије, власништво над производом има већи степен важности од друге независне променљиве за индивидуални радни учинак, што учвршћује захтев за развој софтвера. Процена мултиколинеарности показује да власништво над производима и развојна пракса имају више утицаја на перформансе пројекта него тим који се разматра у студији. Претходне студије нису покривале аспекте као ни области предложене у овој студији да би се дошло до закључка Скрум оквира за перформансе пројекта чиме се и отвара пут за будући истраживачки рад.

Кључне речи: скрум, агилна методологија, перформансе пројекта, усвајање

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