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Understanding the Determinantsof Project Performance: Empirical Evidencesfrom Software Houses of Pakistan

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Abstract: Thisstudy is investigating the effects of project quality, project risk and project governance on project performance. Moreover, this study investigatesthe moderation effect of project leadership on these relationships. Data is collected from 354 respondents of software houses and structural equation modeling (SEM) technique is utilized for data analysis. Results suggest that project quality, project risk and project leadership have positive significant impact on project performance while project governance does not have significant impact on project performance. Significant moderation effect of project leadership on the relationship between project quality and project performance is proved but project leadership has no moderation effect on the relationship between project governance, project risk and project performance. The findings of the study provide significant insights forsoftware houses ofPakistan to formulate strategies in order to develop a governance framework and enhance project performance in IT project management.

Keywords:ITProject Management, Project Performance, Project Quality, Project Risk, Project Leadership

1. INTRODUCTION

IT project management has received significant attention of academician and practitioners during the last decade. This attention is due to failure of many mismanaged software projects [1].According to Han and Huang [2], development of software projects is a highly risky and unpredictable activity. Organizations are devoting more attention and resources on the rapid development of software projects, which may result in compromising the project quality, project risk and ultimately project performance, may suffer. Different researchers analyzed different predictors of project performance e.g. time, cost, quality, risk, leadership, project methodology, operational planning[3]-[4].According to [5], effective project governance is one of major predictors of project success.

Project governance in the domain of project management is an increasing research area focusing on program management, portfolio management and project sponsorship however the phenomenon is still in the phase of development [6].The term of project governance has been used differently by different authors with different meanings and implications[7]-[8]-[6], however the common objective of all of them is to improve project performance. Governance in broader perspective can be understood involving the principles of *"authority, accountability, stewardship, leadership, direction and control"*[9]. To organize the project transactions, project governance encompasses the initiating, terminating and maintaining the relationship with various internal and external stakeholders involved in the project [10]. On the basis of single case, Abednego and Ogunlana[3]explores the role of project governance in risk allocation of each party involved in Project Management (PM) of tollways

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that subsequently affect project performance and utilizes the findings in developing the concept of good project governance. The model developed by this study has overlooked various related phenomenon such as cost and quality issues and corporate governance of overall organization. Extending this line of research, Sankaran, Remington [9] investigated the effects of project governance on project performance using the same model and support empirical evidence from Australia.

However, it seems that there is little amount of empirical evidences on understudy research issues indicating a significant research gap. Moreover, IT industry in Pakistan is facing various problems likeinternet/IP's, inexperienced human resource, funding issues, legal matters, visas & travel, taxation & exemptions and government policies. Thus, there is need to theoretically advance this line of research by keeping in view the significance of project governance, project quality and project risk for project performance.

In order to address the theoretical gap and to offer a solution to the software houses of Pakistan to improve their performance, the current study is aimed at:

Measuring the effects of project quality, project risk and project governance on project performance.

To measure the project leadership as a moderator of the nexus of project risk and quality with project governance and performance

In continuation of aforementioned research objectives, the current study is aimed at answering the following research question with respect to software houses of Pakistan.

What are the effects of project quality, project risk, project governance on project performance and how these relationships are influenced by project leadership?

2. THEORETICAL BACKGROUND AND LITERATURE REVIEW

2.1 Theoretical Background

Project Performance in the software industry is defined as "the extent to which the software development process has been undertaken as well as performance of the delivered system from the view point of the users" [11, p.282]. Taking the notion of project performance by Nidumolu [12], Jiang, Klein [11] suggested that the project performance should be studied from the perspective of product performance as well as process performance. The advocates of this theory have views that every project is of unique nature, so they need a different and contingent way to deal with it. But the critics of contingency theory claim that project leaders with certain leadership styles can only perform effectively in some projects. In the current study, the concept of agency theory has been used to enhance project performance through project governance and other understudy variables like project quality and project risk. Agency theory, basically suggests that principle/project owner has difficulties to motivate his agent to act in principle/owner's best interest. This may result in separation of control and ownership in many organizations [13]. To deal with this problem, principle/project owner needs to have strict monitoring and control mechanisms to govern agent behavior and to prevent agents' abuse of principals' interests implementing monitoring and control over the project. Seen in this way, it can be concluded that Project performance can be increased by continuous project monitoring because greater monitoring can produce good results.In the context of project management, this theory is used to highlight the relationship between project owner and project manager[14].

2.2. Literature Review

2.2.1 Project Governance andProject Performance

The term project governance has been used differently by different authors with different meanings and implications[7]‐[8]‐[6]. For example, project governance as defined by[8] focuses on the value system, responsibilities, processes and policies that allow projects to achieve organizational objectives.Similarly, project governance as defined by[15], focuses on the relationship between the management of a project, its sponsors and other stakeholders and it also focuses on the project objectives and the ways to attain those objectives while monitoring project performance. However, if we compare these two definitions, the first authorhas defined project governance in a broader sense which focuses on organizational objectives and satisfying the interests of internal and external stakeholders. While the later focuses on project level and elaborates that project governance provides a structure which helps to set project objectives and ways to achieve those objectives by monitoring project performance. Governance is more concerned with the process of controlling however it is not to impose authority over internal and external stakeholders for compliance rather to develop good relationship with them and to make favorable decisions for the project [16]. It is also concerned with the governance of the processes of project management ranging from initiating to completion of the project [17]. Besides this, Abednego and Ogunlana [3] view project governance as a good tool to monitor the ongoing performance of the project and to take necessary measures in case problems arise, leading to higher performance of the project through addressing the issues/problems on site. Seen in this way, it can be argued that the effective governance of a project is a significant determinant of project performance because project governance helps project managers to govern, monitor and control different stages and functions of project and to deliver the project benefits to internal and external stakeholders. Thus, the following hypothesis has been developed:

Hypothesis 1: Effective Project governance has positive significant effects on project performance.

2.2.2 Project Quality andProject Performance

Project quality is argued to have significant effects on project performance. There have been many studies reporting the increased quality of project design, service and products as key predictors of project performance[18]-[19]-[20]-[21]-[22]. Lim and Mohamed [23]rated the project success using micro and macro criteria. The micro criterion includes time, cost, quality, performance and safety whilst macro criterion includes micro criteria as well as the quality of products and processes involved in operations. Karlsen and Gottschalk [21] relate the concept of iron triangle comprising of time, cost and quality to project performance that can be assessed during project execution. The same concept was also discussed by Atkinson [18] who also considers the same criteria to measure project performance or to evaluate progress of control related aspects during the delivery stage. Thus, quality of the project design and product does not only measure the project performance but also viewed as significant determinant of project performance as meeting quality standards seems contributing towards increased project performance. In the similar way, Meredith and Mantel Jr [24] are of the view that project performance can be increased through improving various quality related factors such as frequency of measuring customer satisfaction, retrospective impact, team participation in retrospective and the team contribution to retrospective.Discussion above, about the effects of project quality on project performance leads to the development of following hypotheses:

Hypothesis 2: Effective Project quality management haspositive significant effects on project performance.

2.2.3 Project Risk andProject Performance:

Effective management of project risk does have significant potential to improve project performance through addressing various barriers that can hinder the successful completion of the project. Abednego and Ogunlana [3] are of the opinion that risk involved in a project should be properly identified, managed and allocated to the relevant parties involved in order to achieve better project performance. Explaining the concept of how risk management can increase the project performance, Wallace, Keil [25] suggested to develop an effective governance model to better identify and mitigate risk attached with project internal and external environment that can subsequently lead to the increased project performance. They have introduced six dimensions of software project risk that can impact project performance. These include organizational environment risk, user risk, requirement risk, project complexity risk, planning and control risk and team risk. Effective identification and management of such risks do not only reduce the uncertainty for policy makers but also enables project managers to take the targeted preventive measures to avoid potential loss in result of such risk factors. Thus, effective management of risks can facilitate project team to experience increased project performance through better identification and management of such risk factors. The aforementioned arguments about the effects of project risk on project performance lead to the development of following hypothesis:

Hypothesis 3: Effective Project risk Management haspositive significant effects on project performance.

2.2.4 Project Leadership and Project Performance:

The competencies and performance of a leader have long been considered as critical aspects which determine the performance of a project [26]. Various studies have been carried out to study the different types of leadership on project performance[27]-[26]. For instance, Yang, Wu [28] reported the effects of project managers' leadership style and interaction with teams on the project performance in the context of Taiwan. The study further reports that some project managers developed particular leadership styles in order to improve the performance of the project. In the same line of investigation, Nixon, Harrington [26] argued that key reasons of project success/failure are much contested debate so the project managers should develop their leadership style that can best fit in the local and national cultural context. Furthermore, the study suggests prioritizing training to improve leaders' skills that subsequently contributes towards developing the context specific leadership style considering context embedded nature of social world leading us to argue that the universality of a particular leadership style cannot be claimed. Explaining the research gap in this area of research, Turner and Müller [29] reported that leadership style of functional managers have largely been studied in the domain of general management whereas *"the literature has largely ignored the impact of the project manager, and his/her leadership style and competence, on project success"* (p. 59) implying that the role of project leadership in project performance should be explored empirically to offer insights about how the leadership style can contribute towards the successful accomplishment of a project. Thus, to measure the effects of project leadership on project performance, the following hypothesis has been developed:

Hypothesis 4: Project leadership has positive significant effects on project performance

2.2.5 Moderating Role of Project Leadership

An understanding of the importance of "people" to the success of a project has developed rapidly over the

recent decades. Project Management Institute (PMI) defines leadership as *"focusing the efforts of a group of people toward a common goal and enabling them to work as a team"* [30]. The leadership style of a project manager is not only the significant contributor of project success, but without effective leadership, project governance model is difficult to implement in effective fashion and to produce the higher project performancePatanakul and Shenhar [31]. As theoretically project governance involves a set of relationships between different leaders of the project i.e. project management, project sponsor, owner and other stakeholders to achieve project objectives. At the same time, these are the key individuals who implement the project governance model who face difficulties in this process if they are lacking in the required leadership skills that subsequently lower the project performance. On the other hand, if the project leaders are enriched with the required skills and capable of developing a context specific leadership style, the effects of project governance model on the project performance are likely to be multiplied because of the skillfully implementation the project governance model by capable leadership[32]-[33]. Thus, it can be argued that project leadership has potential to affect i.e. strengthen or weaken the relationship between project governance and project performance. In order to test this relationship in the current study, the following hypotheses have been developed:

Hypothesis 5a: Project Leadership moderates the relationship between project governance and project performance.

Hypothesis 5b: Project Leadership moderates the relationship between project quality and project performance.

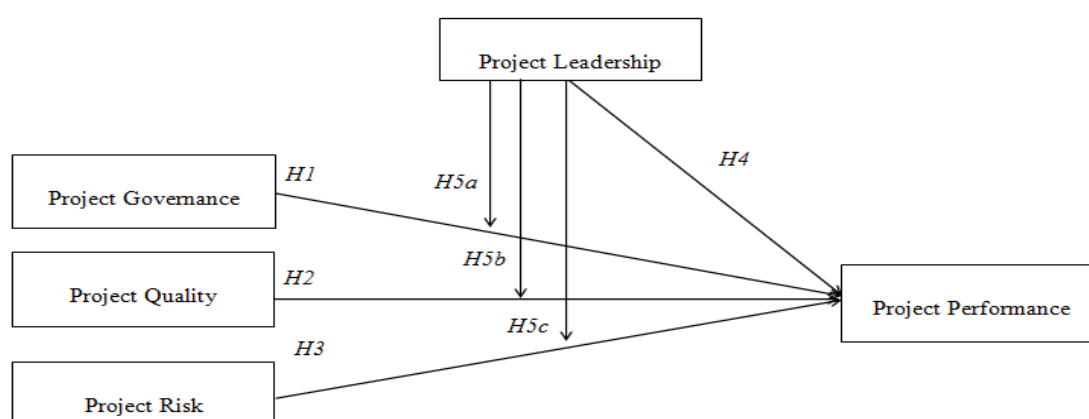*Hypothesis 5c: Project Leadership moderates the relationship between project Risk and project performance.*

Fig.1. Research model

3. RESEARCH METHODOLOGY

3.1 Sample

The target population for the current study issoftware industry of pakistan. List of 200 software houses is obtained from Pakistan Software Houses Association for IT and ITES (P@SHA) and Pakistan Software Export Board (PSEB) associations. Out of 200, 132 software houses were selected by usingsampling formula of Krejice and Morgan[34] [34] [n= $X^2 * NP * (1-P) \div d^2 * (N-1) + X^2 * P * (1-P)$]for data collection. About 500 questionnaires were distributedto each key position holders like head of department, Manager/Team Leader, Analyst, Designers/Programmers and Testers etc.

3.2   ScaleDevelopment

Self-developed scale for project governance is used for this study. The reliability and validity of the scale has been tested. To measure the project risk, ten items scale of Wallace et al.,[25] was used. Project leadership measured with the help of 6 items scale developed by [35]. In order to measure project performance, 8 items scale developed by Turner, Huemann [14] was used. Project quality measured with the help of 6 items scale earlier used by [36]. Some necessary modifications were made in the scale to align it with the objectives of current study. Project governance, project quality and project leadership are measure measured using a five point Likert-type scale.

3.3   Data Collection Process

Data was collected from software houses of Pakistan with the help of a web based survey by using (https://docs.google.com/forms/). The respondents were contacted with an email containing the questionnaire link and a cover letter explaining the objectives of study. 500 questionnaires were distributed initially. Out of 500 questionnaires, 372 questionnaires were received yielding the initial response rate of 74.4%. During data analysis, 354 questionnaires were found complete in all respect and seemed to be useful for the study so the response rate is 70.8%. Thus, 354 responses have been used for final analysis.

3.4   Validity and Reliability Testing

Confirmatory Factor Analysis (CFA) through AMOS software is used to check the validity of the scales. CFA has been used by many researchers to check the validity of measurement scales [37]-[38] . CFA results are given in Table 1. CFA model proved to be good fit after removing the items which have factor loading less than 0.40, non-normal and correlating the residuals of those items which have high covariance with other items as recommended by [38]. By following these criteria, 5 out of 13 items of Project Governance, 1 out of 10 items of project risk and 3 out of 8 items of project Quality have been removed. However, all items of Project leadership and project performance fulfilled the criteria for further analysis. Cronbatch alpha scores through SPSSwere used to test the reliability of measurement scale. The value of Cronbach alpha is in between the 0.80 to 0.88 which is acceptable as recommended by [39]. Therefore, we can say that all variables are found to be reliable.

Table 1: Fitness Indicators of CFA Model

Fit Measures	Value	Acceptable Range	Author
CMIN/DF	2.215	3 to 1	Carmines and McIver [40]
GFI	0.848	≥ 0.80	Davis, Schoorman [41]
AGFI	0.808	≥ 0.80	Davis, Schoorman [41]
CFI	0.902	> 0.90	Steiger [42]
RMSEA	0.05	≤ 0.08	Browne and Cudeck [43]

4. RESULTS AND DISCUSSION

Structural Equation Modeling (SEM) applied for Hypotheses testing by using AMOS. Hypotheses testing iscompleted in two steps. In the first step, direct paths i.e. H1, H2, H3 and H4aremeasured.Model fitness indicators for direct paths show a good model fit (CMIN/DF 2.287, GFI 0.843, AGFI 0.803, CFI 0.896 and RMSEA 0.06). SEM results for hypotheses testing are summarized in Table 2. Hypothesis 2 inspects the impact of project governance on project performance. The analysis reports that the relationship is not significant (p value = 0.88, β = 0.016), i.e. there is no impact of project governance on project performance. However, the β value is 0.016 but P-Value is greater than0.10, which leads towards the rejection of the hypothesis 2.

Theseresults represent the sample of software houses selected for current study; however previous studies identify significant relationship between the variables. There may be multiple reasons for these insignificant results. To enhance the performance of any project, well-disciplined governance structures are needed which are supported by suitable methods, resources and controls throughout the lifecycle project. Software houses of Pakistan are lacking in well-disciplined governance frameworks. Second hypothesis tests the relationship between project quality and project and project performance. It is observed that project quality has positive significant effects on project performance (p value = 0.001, β = 0.173). The results are aligned with the results of previous studiesof [18]-[19]-[20]in which project quality has been discussed as significant predictor of project performance. Third hypothesis investigates the relationship between project risk and project performance. The results depict a positive significant relationship between project risk and project performance (p value = 0.01, β = 0.089). Hence, it is concluded that project risk has positive significant effects of project performance. The results of the current study also confirmed the findings of all previous researches who have concluded that project risk significantly impacts the project performance. The fourth hypothesis indicates the relationship between project leadership and project performance. The relationship turns out to be significantly positive (P-Value=0.00) for the software houses included in this research. The value ofβ for this relationship is 0.123, which represent an adequate strength for effect of project leadership on project performance. Findings of this research study,acknowledged the findings of previous study conducted byNixon, Harrington [26] in which the author concluded that key reasons of project success/failure are much contested debate so the project managers should develop their leadership style that can best fit in the local and national cultural context.
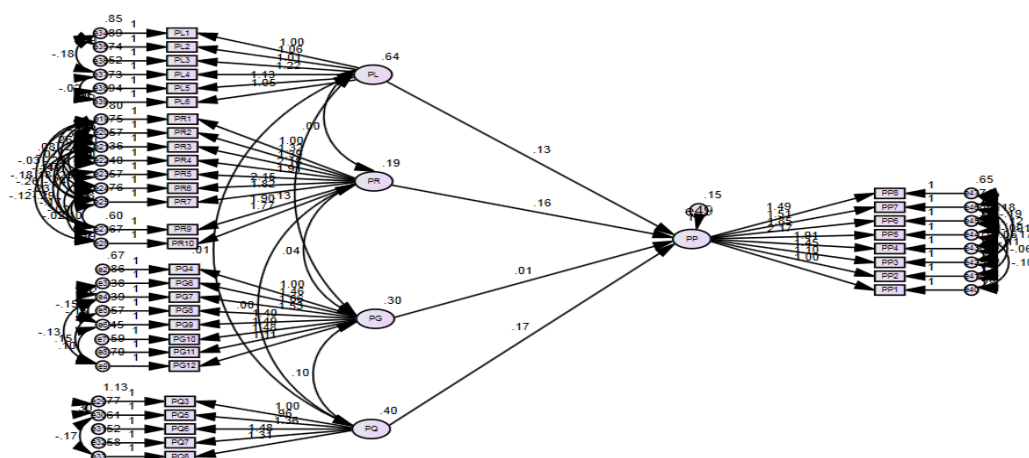

Fig.2. SEM Model (Direct Relationships)

In second step, Moderation Hypotheses (H5a, H5b and H5c) have been analyzed by using Multi Group Moderation in AMOS. For this purposes, multi group moderation procedure explained by Otman [44] have been used. Moderator variable "Project Leadership" is divided into two groups i.e. PLLow(Fig.3) and PLHigh(Fig.4). After analyzing the model in AMOS, Z-Scores are calculated through"Stats Tool Package" developed by [44].Results are given in Table 2. Hypothesis 5a measures the moderation effect of project leadership on the relationship between project governance and project performance. Based on SEM results (p value >0.10, Z-Score = -0.902), hypothesis 5a is rejected. It is found thatthe project leaders are not enriched with the required authorities

that they can create a governance structure for software projects and as a result, the project performance may suffer [32]-[33].Hypothesis 5b investigates the moderation effect of project leadership on the relationship between project quality and project performance. SEM results (p value = 0.001, Z-Score = 2.591) representing that project leadership has strong moderation effects on the relationship between project quality and project performance in the selected software houses of Pakistan which reveal the acceptance of hypothesis 5b.Hypothesis 5c measures the moderation effect of project leadership on the relationship between project risk and project performance. SEM results show an insignificant moderation effect of project leadership on the relationship between dependent and independent variable. Z-Score value stands at 0.576 representing that project leadership explain no variance on the relationship of project risk and project performance in the software houses of Pakistan which reveal the rejection of hypothesis 5c. There may be multiple reasons for insignificant results. For example, projects with higher risk will tend to have more uncertainty regarding performance because project managers put their focus in dealing with risk but performance of project may suffer due to some other issues.
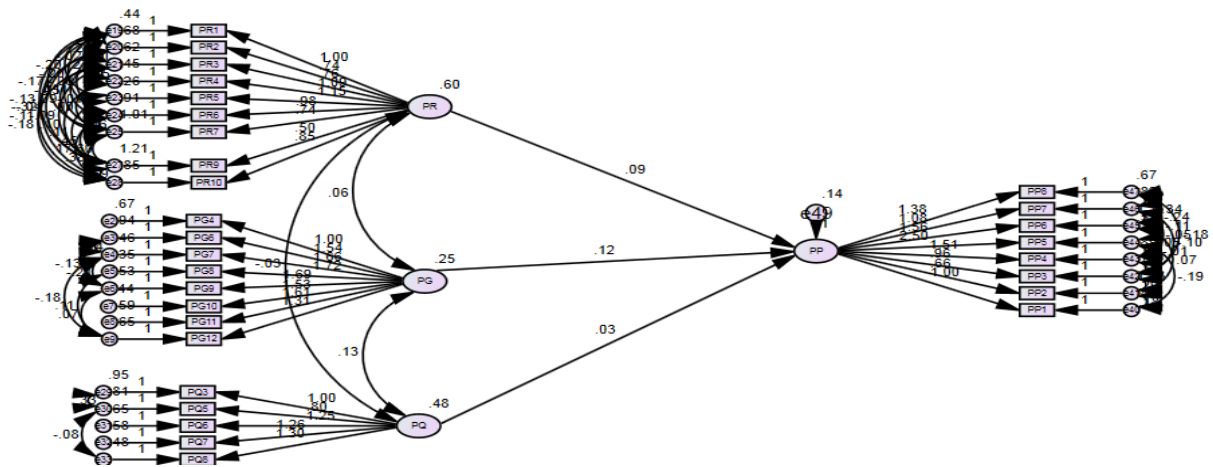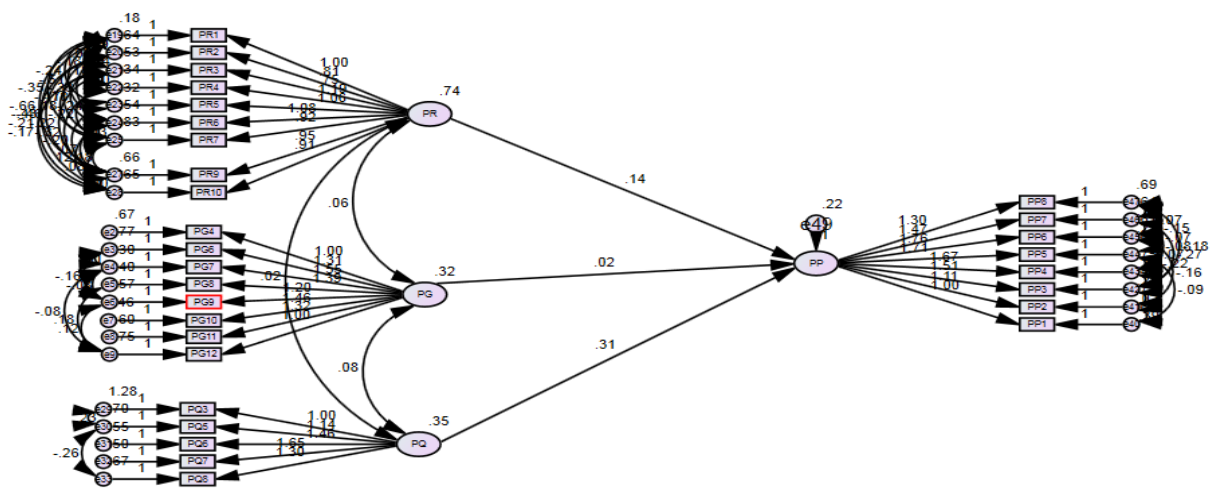

Fig. 3. Moderation of PLLow

Fig. 4. Moderation of PLHigh

Table 2: Fitness Indicators of CFA Model

H. #	Independent Variable	Moderator Variable	Dependent Variable	Path Coefficients	Decision
1	"Project Governance"	-	"Project Performance"	.016	Not Supported
2	"Project Quality"	-	"Project Performance"	0.173***	Supported
3	"Project Risk"	-	"Project Performance"	0.089**	Supported
4	"Project Leadership"	-	"Project Performance"	0.123***	Supported
5a	"Project Governance"	"Project Leadership"	"Project Performance"	-0.902	Not Supported
5b	"Project Quality"	"Project Leadership"	"Project Performance"	2.591***	Supported
5c	"Project Risk"	"Project Leadership"	"Project Performance"	0.576	Not Supported

Note: "*** P-value < 0.01; ** p-value < 0.05; * p-value < 0.10"

5. CONCLUSION

The main objectives of the study is to investigate the effects of project quality, project risk and project governance on project performance and to measure moderation effect of project leadership on this relationship. Data is collected from 132 software houses of Pakistan by using web based questionnaire. Confirmatory Factor Analysis (CFA) and reliability analysis are used for validity and reliability analysisrespectively. Structural Equation Model (SEM) through AMOS 21 is applied for hypotheses testing. After data analysis, the research question "What are the effects of project quality, project risk, project governance on project performance and are these relationships influenced by project leadership?" can be answerednow. It is proved that project quality, project risk and project leadership positively affect the project performance while the impact of project governance has not proved for sampled software houses of Pakistan. Similarly, project leadership proved to have significant moderation role on the relationship between project quality and project performance but project leadership has no moderation effect on the relationship between project governance, project risk and project performance.

6. CONTRIBUTIONS OF THE STUDY

This study is pioneering in the software houses of Pakistan because no previous study examined the selected set of variables in the IT industry of Pakistan. According to best of researchers' knowledge, all understudy hypotheses are not studied before in the IT industry of Pakistan. The moderation hypotheses H5a, H5b and H5c have been developed and analyzed for first time in the literature of project management and IT industry anywhere. Therefore, it's a major contribution of this study for the IT industry of Pakistan as well as for project management literature. The study provides significant insights to the software houses of Pakistan and suggestions have been made tocan formulate strategies to measure the performance of ongoing projects while dealing with project quality, project risk and project governance at the same time.

7. IMPLICATIONS

The study provides following implications for software houses of Pakistan in order to track and enhance the performance of project.

- First of all, project governance should be given considerable attention in order to improve project performance in software houses of Pakistan. Software houses should have well-structured governance frameworks which are supported by suitableapproaches, resources and control mechanisms should be applied at every stage of project life cycle.As the project manager is mainly responsible for project, so the project managers must have strong knowledge about governance frameworks.

- Considerable attentionshould be given to project quality.Standard coding systems should be followed for better project quality. Moreover, there should be continuous review of ongoing project.

- In order to deal with potential risk, project managers should have accurate estimation of required resources.Moreover, attention should be paid on strong project planning and should define project milestones carefully.

- Project managers, team leaders should haveauthority, capability and resources to enable them to make appropriate decisions.

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