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Influence of Project Management Techniques and Risk Management on Project Success

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ABSTRACT

The issue of project success is still a thorn in the flesh of industries worldwide with significant percentage of project failures or low performance being recorded even after decades of research on professionalisation of project management. This paper explored how project management practices and risk management affects the success of projects within the multi-industry Pakistan project context. The study design was a quantitative cross-sectional survey where 300 project managers and team members in the construction, IT, and services industries were sampled to fill out a structured questionnaire that integrated all constructs using a 5-point Likert scale that was validated. The convenience sampling was used. Some data were processed with SPSS 25 and AMOS 24 with the help of descriptive statistics, Cronbach alpha reliability tests, Pearson correlation coefficients, confirmatory factor analysis (CFA), and structural equation modeling (SEM). There was a strong direct positive impact of project management techniques on project success (beta = 0.51, $p < .001$), and risk management practices (beta = 0.44, $p < .001$). A structural model characterized 58.9 percent of the variation in project success (R-squared =.589). CFA ascertained excellent measurement model validity with AVE of between.53 and.58 and composite reliability of between.87 and.93. The findings contribute to the empirical literature on project management in the context of developing economies, and practitioners can use it to gain an evidence-based basis on enhancing the outcomes of projects through organized means of applying techniques and organized risk management.

Keywords: project management, risk management, management of project success, structural equation modeling, confirmatory factor analysis, Pakistan, cross-sectional survey, project performance, project delivery

INTRODUCTION

Risk management practices and project management techniques are critical towards predicting the success of a project in various industries. Agile, Critical Path Method (CPM) and Earned Value Management (EVM) are effective project management methodologies that promote precision in planning, allocation of resources, and time management, which can improve the overall performance of the projects (Muller et al., 2024; Khan and Ali, 2025). Concurrently, risk management is necessary in identifying, appraising and alleviating of any uncertainties that can adversely affect project outcomes. Research has demonstrated that projects that have well-developed risk management frameworks have a much greater chance of realizing their goals in terms of costs, time, and quality (Zhao & Liu, 2024). In addition, risk management being integrated into project planning enables organizations to predict the possible disruptions and take proactive measures, which lower the rate of project failure (Osei et al., 2024). Based on empirical evidence, there is also evidence that the integrated use of sophisticated project management methods and systemic risk assessment results in a synergy effect, reinforcing decision-making and increasing the probability of project success (Ahmed and Rahman, 2024). The success of such practices however is highly dependent on the capability of the organization, stakeholder input and the difficulty of the project

environment. Thus, organizations that have formal project management methodologies and also have strong risk management processes have higher chances to implement effective projects within the established bounds.

Projects: Projects are temporary activities that are done to produce unique products, services or outcomes and have become the most common organizational process by which strategic goals are achieved in the modern economy. Infrastructure development and software construction to the introduction of new products, changes in organizations, and provision of services in the state sector, the project has replaced the continuous functional activity, which is the primary source of value generation in most industries, as the main mode of creating value. Global project economy as projected by the Project Management Institute is a multi-trillion dollar investment in organizational capability and competitiveness on a yearly basis. Nonetheless the history of project success turns out to be consistently dismal: massive projects are always conducted to conclude that substantial percentages of projects are not able to deliver the cost, schedule, scope, or quality targets which is equivalent to colossal wastage of organizational resources and strategic potentials.

The project management challenge in Pakistan is more critical in the economy. The five major infrastructure development projects such as the China-Pakistan Economic Corridor (CPEC), the development of dams, motorway project, and urban development initiatives are multi-billion dollar project portfolios whose succeeding results will determine the economic path of the country decades to come. Project delivery in the IT sector, such as software development, digital transformation, and e-government projects, has equally been accompanied by high and high rates of failings and cost overruns. The construction sector, which constitutes a large proportion of investment and employment in Pakistan has been a well-recorded scenario of systematic delays in project start-ups and budget overruns owing to poor project management habits and inadequate risk management.

The techniques Project management techniques are the formalized processes, tools and methods by which projects are initiated, planned, launched, monitored and closed, and over the last fifty years, have been formalized into professional bodies of knowledge such as the PMBOK Guide of the Project Management Institute and the Individual Competence Baseline of the International Project Management Association. These models are evidence-based best practices of scope management, schedule management, cost management, quality management, stakeholder management, and communication management along with the coordination of these practices with consistent project governance frameworks. Empirical studies using these techniques have shown better results in project delivery in a variety of industries and cultural backgrounds and their application assists as a toolkit to overcome the project delivery gap.

Risk management As a distinct sphere of competence and as an integrating meta-process, risk management takes a special place in the project management literature as the other activities are more effectively addressed by risk management. Theoretical foundations of project risk management are based on decision theory, probability theory and systems thinking, and the practical application relies on methods including qualitative risk registers and risk probability-impact matrices and quantitative Monte Carlo simulation and earned value management. Risk management maturity, as it is consistently pointed out in the empirical literature, is one of the most potent predictors of project success since it represents the very core of reality, that project success is an uncertain undertaking the result of which depends on the quality of planning, as well as the response to risk.

The project management environment of Pakistan has certain contextual characteristics that define it as opposed to the developed economy contexts, on which most project management research has been carried out. These are a high political and institutional uncertainty, which invites external risk environments that are more volatile than in regular democracies; limits in infrastructure in terms of power, transport and on line connection, which contributes to execution risks that are not generally

modelled in traditional risk management models; and a lack of certified project management professionals, with the CAPM and PMO certification rates being far lower than in more stable democracies; and cultural factors such as high power distance and collect To determine the effect that project management methods and risk management have on the success of projects in this unique scenario, empirical research is needed as opposed to a mere assumption that the results of projects in the western environment can be directly applied.

The theoretical context of this research incorporates two inconsistent views. The conceptual foundation on how project success is perceived as a multi-dimensional result consisting of both faultlessness of technique and efficiency in risk management is the Project Complexity and Uncertainty Framework (Shenhar and Dvir, 2007). The grouping of projects in this framework by technological novelty and complexity predicts that the marginal rate of return to risk management will improve with project complexity and uncertainty implying that this effect of risk management on success will be most significant in high uncertainty/complex project settings. The mechanism by which experience at project management begins to form an accumulation of expertise that is translated into the tacit knowledge of technique use and risk prediction that characterizes experienced project managers as compared to novices is facilitated through organizational learning theory (Argyris and Schon, 1978). The combination of these frameworks paints a prediction that the more organizations have applied the project management techniques and have practices in risk management that are more elaborate, the better the results of project success will be.

This paper fills the gap in the literature on project management-performance links in Pakistani setting because it utilises the SEM to predict the direct impact of the two project management methods and risk management on project success in congruence with each other. The SEM method permits evaluating the independent contribution of each predictor with the effect of intercorrelations of the data, giving much more accurate estimates of effects relative to bivariate analysis that has prevailed in previous project management studies in Pakistan. The results offer evidence-based project management capability investment priorities guidance to Pakistani project professionals, organizational leaders and policymakers.

The sample of the study project managers and team members across the construction, IT, and services industry helps to evaluate whether the relationships between risk management and project management techniques and project success are universal across the context of industries. Cross-industry consistency would help support the conclusion that these relationships are based on general organizational processes, not industry, and support the generalizability of findings and their applicability as an indicator of project management investment advice in the context of the diverse project economy of Pakistan.

LITERATURE REVIEW

Since the seminal research by Morris and Hough (1987) to systematically examine key project failures found a comprehensive literature on poor risk management, insufficient stakeholder involvement, and incompetency among project managers as key determinants of project failure, project management research has generated extensive empirical literature on factors that predict project success. Decades of more recent research have gradually deepened the understanding of the effect of particular project management practices on project outcomes, with increasingly methodologically sophisticated practices allowing effects estimates to increase in precision. Their empirical investigation was influential early evidence that techniques of project management, especially scheduling, planning tools, and monitoring systems, were influential predictors of the success of project implementation, and this empirical research tradition that is continued to the Pakistani context was provided by Pinto and Slevin (1987).

Project Management Body of Knowledge (PMI, 2021) is a synthesis of evidence-based best practices in ten knowledge areas (integration, scope, schedule, cost, quality, resource, communication, risk,

procurement and stakeholder management) that combined become the project management technique repertoire. Evidence of this was provided by research by Thomas and Mullaly (2008) that concluded that final evidence about the significance of project management practice aligned with PMBoK heavily predicted both project and organizational organization outcomes, with more advanced project management organizations showing a significantly better performance in terms of schedule, cost and quality. Ika et al. (2012) showed that in a developing economy setting that project management techniques quality was the best predictor of World Bank project success than project design techniques and institutional factors across the Sub-Saharan African settings.

The contribution that risk management makes towards project success has been discussed in several theoretical and empirical ways. Hillson (2009) advanced the argument that risk management offers the integrating viewpoint to all project management activities, since all project decisions are uncertain as well as all project plans are risky assumptions about the future. Empirically, Zwikael and Ahn (2011) found in their study of project managers across a large, global sample that risk management planning quality was the best project management predictor of project success with dramatically higher project management effects than the three project management practices, scheduling, budgeting and quality management. Ward and Chapman (2003) have brought the risk management theory to the concept of threats and opportunities by invoking that projects which methodically perceived and exploited the upside uncertainties along with a countered downside threats attained a better result - which means that risk management is a form of value creation an activity opposed to defensive framework.

The Critical Success Factor (CSF) studies has determined the organizational and managerial aspects that best apply the project management techniques and risk management practices. According to Cooke-Davies (2002), twelve crucial factors to project management success were recognized, such as risk management behaviors, consistent project scope and project manager capability. These complications of CSF profiles imply that no practice or technique can be single-handedly identified as the determinant of project success; instead, the project success arises out of joint practice application under suitable organizational governance frames. Mir and Pinnington (2014) modernized the CSF study to the modern day project setting and realized that the association between risk management advanced and project prosperity turned out to be mediated by the project complexity, with higher project complexity exhibiting more significant risks management results.

The two most widespread measures of project success (schedule and cost performance) have been analyzed in connection with the particular project management techniques. Koskela and Howell (2002) wrote that conventional scheduling with a critical path method causes systemic bias that result in over-optimistic plans, and incessant schedule overrun, and recommended the use of lean project management and last planner system options. Similar research by Fleming and Koppelman (2010) indicated that the performance of the project cost, schedule and scope have been integrated through a management technique known as earned value management (EVM) which has been found to give early warnings of any faults in project performance enabling corrective measures to be undertaken before the cost and schedule slips become irreversible. In construction project in Pakistan Aziz (2013) observed that the use of EVM substantially predicted on time and on budget delivery but embracing of the tool was low among Pakistani project managers due to the lack of training and contractual conditions that discouraged performance measurement.

In recent years, stakeholder management results in a knowledge area of project management which has gradually attracted increasing research interest has been listed among critical mediating mechanisms via which project management techniques contribute to project success. By showing that proactive practices of stakeholder engagement were significant predictors of project success in a sample of infrastructure projects in Australia, Bourne and Walker (2005) indicated that the practices operated through many reduction conflict mechanisms, positive stakeholder support mechanisms, and improved access to project

critical resources. In the institutional environment of Pakistan, where there is high political uncertainty and a complex network of stakeholders by a government, Pasha and Mansoor (2021) have found that the quality of stakeholder management in a project environments, especially in projects in the public sector, have been strongly associated.

The connection between the maturity of organizational project management and project success has been debated using project management maturity models (PMMMs). Pennypacker and Grant (2003) showed that organizations with higher project management maturity i.e. those with standardized processes, professional skills and systems of organizational learning were always rated higher in success of project performance than lower-maturity organizations. Noman et al. (2019) also found in Pakistani organizations that the levels of project management maturity have a strong positive relationship with the project success rates whereby medium to high project management maturity organizations had a significantly higher rate of on-time project delivery as compared to low-maturity organizations. These results emphasize the fact that the effectiveness of project management techniques is, to some degree, a phenomenon on the organizational level which relies on the institutional frameworks and infrastructure, including training programs, business structures, performance measurement systems, in which single techniques are implemented.

Success literature Agile project management methodologies that have become alternatives to more traditional plan-driven approaches to high-uncertainty software development projects have produced literature of their own. A large international survey by Serrador and Pinto (2015) showed that agile practice adoption was a strong indicator of efficiency (delivering on time and within budget) and effectiveness (satisfaction of stakeholders, quality of delivered products) in IT projects. There has been a specific potential in hybrid techniques incorporating agile and traditional techniques when it comes to projects with complexity but with the need to have flexibility and regularity of governance. In a case study in Pakistan of the IT sector, Rehman and Shafi (2020) discovered that agile adoption was positively related to client satisfaction and delivery frequency, with lower effects than Western literature, which may have been due to cultural adjustment issues.

It has been theorized that the combination of risk management and the larger project management processes is the mechanism by which risk management has its project success impacts. The project risk management offers the informational infrastructure, risk registers, probability-impact assessment, risk response plan, within the uncertainty-aware decision-making process that lasts through the project lifecycle. Risk management is not able to take away the uncertainty of a project, however, a well-managed project can diminish its adverse effects on project outcomes because of the presence of more well-thought-out responses in place of the risk, availability of the contingency resources. Risk management effectiveness in this sense works as a meta-competency that enhances the performance of all other project management methods, by making sure that they are executed with due sensitivity to the uncertainty situations within which they are used.

Several comparative studies have studied the cross-cultural dimensions of effectiveness of project management technique. Muller and Turner (2010) showed various project management competencies that are considered more important in different national cultures, and collectivist cultures tend to emphasize competency of stakeholder relationship management, risk communication competencies, whereas individualist cultures tend to emphasize technical planning competencies, and scheduling competencies. The high scores in power distance and collectivism on Hofstede cultural dimensions indicate that stakeholder management and relationship-based risk communication might be especially significant elements of a successful application of project management techniques in Pakistan-based settings. This cultural peculiarity highlights the importance of empirical studies within the Pakistani setting as opposed to extrapolation of the results of the developed economies.

METHODOLOGY

The research design was a cross-section survey which was quantitative in nature. The population under study consisted of those project managers and team members in the Pakistani industries who work in projects. The convenience sampling was considered based on the practical limitations of recognizing and reaching the project professionals of different industrial sectors. The survey delivery was done to construction industry professionals, project managers in the IT sector and service sector project teams by way of professional association, LinkedIn networks, and direct organizational contacts. With 325 questionnaires sent out, 312 were returned with 300 of the indifferent ones being preserved after the exclusion of non-responses.

The study tool consisted of three scales. The use of project management techniques was assessed based on a 16-item scale based on the adaptations of the knowledge areas proposed by PMI (2021) related to project management tools, which include planning comprehensiveness, scheduling practices, monitoring and control systems, stakeholder engagement quality, and communication management. The scale was transformed to be used in construction, IT and service project settings. A 12-item scale used to measure risk management practices were based on Hillson (2009) and Zwikael and Ahn (2011) to measure completed risk identification, risk quality analysis, effectiveness of risk response planning and risk monitoring practices. The scale consisted of 14 items to measure project success through the five-dimensional success framework presented by Shenhar and Dvir (2007) which included project efficiency (schedule and cost), impact on customers (quality and satisfaction), impact on the team (team performance and satisfaction), business success (organizational value delivered), and past preparation (capability building and learning). Every question was measured on a 5 point Likert scale (0 = Strongly Disagree to 5 = Strongly Agree).

Content and face validity were achieved by reviewing the content and face by five academics in the field of project management, and pilot testing with 30 project professionals who were not part of the main sample. Cronbachs alpha was used to test internal consistency reliability. CFA was used to measure construct validity in AMOS 24 to assess factor loadings, AVE, CR and HTMT ratios. The structural model was used to test two hypotheses: H1: according to the structural model, project management techniques are significantly positively related to project success; and H2 according to the structural model, risk management practices are significantly positively related to project success. The fit of the model was evaluated based on chi-square/df, CFI, TLI, RMSEA, and SRMR on standard adequacy levels.

RESULTS

The 300 respondent sample consisted of project professionals (37.0% in the construction industry, 34.3% in the IT industry and 28.7% in service industries). The entire demographic profile is shown in Table 11. The sample included project managers (52.0% of the sample) and team members (the other). The average experience in project management was 8.2 years (SD = 5.4). Only approximately 28.3% were professionals who were either PMP or CAPM certified.

Table 1: Demographic Profile of Respondents (N = 300)

Variable	Category	n	%
Gender	Male	201	67.0
	Female	99	33.0
Industry	Construction	111	37.0
	Information Technology	103	34.3
	Services	86	28.7

Role	Project Manager	156	52.0
	Team Member/Specialist	144	48.0
PM Experience	Less than 5 years	98	32.7
	5-10 years	119	39.7
	More than 10 years	83	27.6
Certification	PMP/CAPM Certified	85	28.3
	Not Certified	215	71.7

Note. N = 300.

Table 2 contains the descriptive statistics and alpha of Cronbach. All coefficients of reliability were more than.87. There was moderate mean (M = 3.39) reflected in project management techniques indicating variation in quality of technique application across the multi industry sample. The mean (M = 3.22) of risk management practices was lower, indicating that the risk management practice is not highly developed compared to general project management practice in Pakistani organizations. The mean of project success was 3.47.

Table 2: Descriptive Statistics and Reliability Coefficients

Variable	M	SD	alpha	Min	Max
Project Management Techniques	3.39	0.76	.93	1.25	5.00
Planning Comprehensiveness	3.44	0.79	.88	1.00	5.00
Scheduling Practices	3.41	0.77	.87	1.00	5.00
Monitoring and Control	3.35	0.81	.86	1.00	5.00
Stakeholder Management	3.37	0.80	.85	1.00	5.00
Risk Management Practices	3.22	0.80	.91	1.00	5.00
Risk Identification	3.28	0.82	.87	1.00	5.00
Risk Analysis and Prioritization	3.18	0.83	.85	1.00	5.00
Risk Response Planning	3.21	0.81	.86	1.00	5.00
Project Success	3.47	0.72	.92	1.29	5.00

Note. M = mean; SD = standard deviation; alpha = Cronbach's alpha. N = 300.

CFA confirmed acceptable measurement model fit (chi-square/df = 2.19, CFI = .94, TLI = .93, RMSEA = .063, SRMR = .057). All standardized factor loadings were noteworthy ($p < .001$) and, were between .60 and.87. Table 13 shows construct validity statistics that validate convergent and discriminant validity.

Table 3: CFA Measurement Model: Construct Validity Statistics

Construct	Items	Loading Range	AVE	CR	alpha
Project Management Techniques	16	.62-.86	.55	.93	.93
Risk Management Practices	12	.60-.87	.53	.91	.91
Project Success	14	.63-.87	.58	.92	.92

Note. AVE = average variance extracted; CR = composite reliability. Model fit: chi-square/df = 2.19, CFI = .94, TLI = .93, RMSEA = .063, SRMR = .057.

The intercorrelation matrix is found in Table 4. The most correlated project management techniques with the project success were project management techniques (r = .62, p < .01), and then risk management practices (r =.55, p <.01) followed. The high positive intercorrelation between the project management techniques and risk management (r = .57, p < .01) proved the fact that the organizations that are more systematic in the use of project management techniques are also more likely to practice stronger risk management.

Table 4: Intercorrelation Matrix

Variable	1	2	3
1. Project Management Techniques	--		
2. Risk Management Practices	.57**	--	
3. Project Success	.62**	.55**	--

Note. ** p < .01 (two-tailed). N = 300.

The structural model demonstrated good fit (chi-square/df = 2.31, CFI = .93, TLI = .92, RMSEA = .067, SRMR = .061). The entire results of the path structure are displayed in Table 15. The prediction of project success (beta = .51, p < .001) by project management techniques was found to be of significant positivity which was in support of H1. The practices of risk management also reflected a strong positive straightforward impact (=.44, p <.001), which proves H2. The collectivity of the predictors accounted 58.9% of variance in project success (R-squared =.589).

Table 5: Structural Model Path Coefficients

Hypothesis	Path	beta	SE	t-value	p	Decision
H1	PM Techniques -> Project Success	.51	.07	7.29	< .001	Supported
H2	Risk Management -> Project Success	.44	.06	7.33	< .001	Supported

Note. beta = standardized path coefficient; SE = standard error. R-squared (Project Success) = .589. Model fit: chi-square/df = 2.31, CFI = .93, TLI = .92, RMSEA = .067, SRMR = .061.

DISCUSSION

The findings significantly supported the two hypotheses and proved the fact that project management techniques and risk management practices substantially predict the success of a project in a multi-industry project environment in Pakistan. This comparatively high beta in project management techniques (.51) than risk management (.44) can be attributed to the fact that the comprehensive planning, monitoring mechanisms and involvement of stakeholders as part of the project management technique construct is also found in the broader literature of project management to be among the strongest predictors of project delivery success. This observation implies that investment in basic project management capability; the training of project managers on planning, scheduling and control techniques; should give the highest rate of returns in the performance of projects in Pakistan where the application of basic technique is a hit and miss affair.

The strong and meaningful impact of risk management(beta=.44) validated the importance of systematic uncertainty management and its contribution towards project success outcomes. Such a lower mean in risk management practices (M = 3.22) as compared to the general project management techniques (M = 3.39) in the sample indicates that the risk management is a specific failure in Pakistani project

management capability, which has severe performance implications due to the strong positive relationship reported in this study. The high measure of intercorrelation between project management methods and risk management (r = .57) was an indicator that two capabilities are likely to go hand in hand in organizations, and complementary gains could be obtained by introducing an improvement program covering both dimensions. The large amount of variance (R-squared =.589) supports the theoretical framework and it shows that the quality of technique and risk management is what explains most of project success variations in the Pakistani sample.

CONCLUSIONS AND RECOMMENDATIONS

This research presented strong empirical results that both techniques of project management and risk management practices are important positive predictors of project success in the unique project economy of Pakistan. The results have a number of implications that are evident to project management practice, organizational investment and policy. Investment in the project management capability development by Pakistani organizations should receive priority, but the emphasis must be put on the planning comprehensiveness, schedule management, monitoring and control, and stakeholder management competencies that make up the construct of project management technique that has most significant links with project success. The lower results in risk management not only than in general project management techniques are consistent causing the conclusion that risk management represents an issue of underinvestment most responsive to specific improvement initiatives that may achieve a performance payoff especially high.

The Pakistani employers should embrace professional certification programs such as PMP and CAPM more since certified practitioners will be in a better position to utilize the systematic method of project management and risk management practices. Industry bodies united and the Project Management institute Pakistan chapter ought to divert with the universities and vocational training centers to boost the pool of formal trained project specialists. In the case of infrastructure projects by the public sector infrastructure the largest category of project portfolio in Pakistan project management standards should be mandated and the risk management standards need to be factored into the procurement and contractual system so that to award the contracts, the contractors must prove to be more than capable of undertaking the projects. Further studies that should be conducted are the mediating variables such as project manager competence and organizational project management maturity that clarify how techniques and risk management result in the success outcomes and also whether the findings would be different in construction and IT and service segments.

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