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RESEARCH ARTICLE

Project Risk Management Practices and Project Success: The Moderating Role of Transformational Leadership

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Abstract: This study examines how operationalised project risk management practices (PRMPs), risk identification, risk assessment, and risk transfer, affect project success in Pakistani public sector organisations. It also tests the moderating role of transformational leadership (TL) in the relationship between PRMPs and project success. The study closes gaps in the literature because, although risk management techniques are often debated in theory, they are rarely used methodically in practice, particularly in project-based businesses in developing nations. 186 employees of a public-sector project-based organization in Pakistan were given structured questionnaires with validated Likert scales as part of a quantitative, cross-sectional descriptive approach. The sample size was conveniently calculated using Yamane's (1967) method. According to Cohen, Cohen, West, and Aiken (2013), the data were analysed in SPSS utilising reliability, descriptive, multicollinearity and heteroscedasticity diagnostics, correlation analysis, multiple regression, and hierarchical moderation analysis. The findings show that risk identification ($\beta = 0.39$, $p < 0.01$), risk assessment ($\beta = 0.34$, $p < 0.01$), and risk transfer ($\beta = 0.28$, $p < 0.01$) all have favourable and substantial effects on project success, accounting for 52% of the variance in project success. According to moderation analysis, there is a substantial positive relationship between risk management methods and project performance ($\Delta R^2 = 0.09$, $p < 0.01$). Drawing from the theories of Expected Utility Theory, Social Exchange Theory, and Transformational Leadership Theory, the study adds to the body of knowledge on project management by validating an integrated model in the context of Pakistan's public sector and recommending that top management take transformational leadership into account as a crucial facilitator of risk-aware project execution.

Keywords: Project Risk Management, Risk Identification, Risk Assessment, Risk Transfer, Project Success, Transformational Leadership, Moderation, Public Sector, Pakistan

Introduction

The first stage in a successful project is risk management. To reduce the risk of project failure, organisations should use systematic risk management practices that ease the impact of predictable issues that might arise. Risk identification, risk assessment, and risk response are all part of the current viewpoint (Ciric Lalic et al., 2022; Khan et al., 2020). In order to ensure that risk awareness-based behaviour is not merely a technical exercise and that risk awareness culture can be promoted throughout the organization, senior management must simultaneously be involved in the creation of risk management plans (Xiaolong et al., 2021). In project organizations, the relationship between risk management performance and project outcomes is becoming a more prominent topic of discussion with managers, and leadership style was found to be an important moderator of the relationship (Zaman et al., 2020; Zhu et al., 2021).

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Risk management is simply understood as the systematic approach to decision making that minimizes the impact of the potential hazards and increases value creation (Ciric Lalic et al., 2022). In construction, engineering, infrastructure and public services (CEIPS) industries, risks manifest themselves as scope creep, budget overruns, schedule slippage and quality compromises (Khan et al., 2020). Lack of understanding of risk practices and limited resources and poor leadership involvement hinder the use of risk management in practice (Xiaolong et al., 2021). The lack of control over these risks is directly related to the increase in costs, project delays and the lower level of functionality of completed projects (Chatterjee et al., 2021). On the other hand, risks are recorded, evaluated, and managed early in the planning process, thus increasing the chances of the project being successfully completed (Zaman et al., 2021).

In parallel, the theory of 'transformational leadership' has become an important factor in determining project success. Transformational leaders set a clear vision; gain the followers' trust; cognitively challenge the followers; and give individualised consideration that all lead to improved team motivation, communication, and willingness to reveal and act on threats (Zaman et al., 2020; Zhu et al., 2021). Empirical research invariably links transformational leadership to better project results (Ayat et al., 2021; Chatterjee et al., 2022; Chen et al., 2023). With proper risk management, transformational leadership builds confidence between organizations and their employees, and that is key to the effective delivery of complicated projects.

Although these constructs are of practical value, it is recognized that there is a knowledge gap in the application of risk management practices in the day-to-day running of projects, especially in project-based public-sector organisations in developing economies (Grošelj et al., 2020; Imam & Zaheer, 2021). Previous research has tended to centre on bigger private-sector companies, with project-based organisations (PBOs), the moderating effect of leadership and developing country contexts like Pakistan being underrepresented (Chen et al., 2023; Ferraras-Méndez et al., 2022; Shaukat et al., 2022). The public sector in Pakistan, especially, is very much under regulatory and budgetary constraints, and the impact of poor risk management is magnified. To bridge this gap, the present study draws attention to the impact of risk management practices on project success and how transformational leadership can play the role of moderator in this relationship in the context of the public sector of Pakistan.

Research Gap

A specific gap in the field is that risk management approaches, no matter how broad or sophisticated, are still seldom systematically applied in the daily routine of projects (Grošelj et al., 2020; Imam & Zaheer, 2021). Project-based organisations and individual projects have received less empirical attention than larger firms and enterprises in this regard. Mitikie and Lee (2017) identify risk response, risk identification, and risk assessment as core risk management practices, while Latif et al. (2020) suggest that transformational leadership functions as a meaningful moderator of leadership–outcome relationships. The integration of these strands risk management practices, transformational leadership as a moderator, and project success as the outcome has not been adequately tested in Pakistan's public sector (Shaukat et al., 2022; Wang et al., 2020; Zaman, 2020). The present study fills this gap by empirically testing an integrated model in this context.

Although transformational leadership has been identified as a factor that can improve organisational performance, its incorporation in project risk management frameworks is still very theoretical. Leadership is generally not considered to be a state or active moderating variable that influences the relationship between risk practices and outcomes in most of the current models. In developing countries such as Pakistan, with weak institutional capacity and politically dynamic project environments, there is a significant disconnect between the formal risk management systems and their implementation. This misalignment implies that technical risk procedures need to be complemented with contextual enablers, especially leadership quality, as they are not enough on their own to obtain a full picture of what is important to project success in this context.

Problem Statement

In the context of Pakistan's public sector, the current study investigates the effects of risk management techniques on project success as well as the moderating influence of transformational leadership. The literature review of project risk management has found that most of the studies have been on management technique and productivity in the workplace, while less work is done on how social dynamics within project teams affect these. This inaccuracy is significant because, according to Social Exchange Theory, interpersonal interactions and leadership styles are linked to project success in addition to effective risk management.

Social Exchange Theory states that the exchange of resources (e.g. trust and commitment) within social exchange are important factors in explaining individual behaviour within project situations. In the context of risk management, the nature of trust and reciprocity engendered by the transformational leader can have significant impact on the application of risk management practices and the identification, analysis and management of risks throughout the project lifecycle. Yet many organisations do not fully take into account these social aspects. Thus, the present study examines the moderating role of transformative leadership between risk management practices and project success in this institutional context.

Objectives

- To examine the impact of risk identification on project success in Pakistan's public sector.
- To examine the impact of risk assessment on project success in Pakistan's public sector.
- To examine the impact of risk transfer on project success in Pakistan's public sector.
- To investigate the moderating role of transformational leadership in the relationship between project risk management practices and project success.

Research Questions

- What is the impact of risk identification on project success in Pakistan's public sector?
- What is the impact of risk assessment on project success in this context?
- What is the impact of risk transfer on project success in this context?
- What is the moderating role of transformational leadership in the relationship between risk management practices and project success?

Significance of the Study

The contribution of this study is a multi-dimensional one that includes theoretical, managerial and wider social contribution. The study seeks to expand the empirical scope of risk management and transformational leadership research into a public-sector, project-based context that has been under-represented in the literature, and in a developing country setting.

Theoretical Significance

Project risk management is an integral part of goal setting in any organisation as those that neglect to manage risks are vulnerable to losing control when risks occur. Threats originate both inside (data breaches, control failures) and outside (political instability, currency fluctuations) the organisation. This study contributes to theory by empirically testing the relationship between risk management practices and project success as well as the relationship between transformational leadership and project success and their resulting interaction. It also addresses the call for more empirical work in the field of risk management in project based organisations of Pakistan.

Managerial Significance

The results have implications for practitioners who will assist managers, donors and public sector managers in understanding the value of incorporating risk management methods into project planning and implementation. It underscores the value of risk management methodologies to help improve project

performance and increase the likelihood of on-time, on-budget and on-quality project delivery. The study shows that transformational leadership enhances this effect, which will provide practical tips for top management to consider leadership development as a strategic complement to risk management.

Literature Review

The Concept of Risk Management

Risk management is a basic problem of decision-making in the presence of uncertainty. The project manager is usually the key decision-maker in a project, and his or her role is to identify, evaluate, and manage risk (Committee et al., 2021). Although there has been a lot of literature, few project managers are using risk management techniques in practice on a systematic basis. The top risks for project efficiency are usually lack of funding, lack of clarity in specifications, and unrealistic timeframes, impacting budget, scope and timeline (Fekete et al., 2021).

The empirical evidence on the impact of risk management on organisational performance has yielded mixed but mostly positive results. Ndwiga et al. (2018) show that risk reduction measures such as loss control, risk mitigation and risk transfer positively affect the financial performance, whereas Shahroudi et al. (2020) indicate that reducing risk exposure increases service quality and financial performance. Previous research indicates that risk management has a positive relationship with firm performance (La & Choi, 2021), but the effect is relatively small when the quality of the managers is controlled (Kerzner, 2022; Nobanee et al., 2021). The literature provides a general understanding that systematic risk management practices are meaningful in the context of project outcomes.

Risk Management Principles

Risk management is based on a number of accepted principles. These principles lay the foundation for the efficient and effective risk management and guide on how value is created and maintained (Parsamehr et al., 2023). The principles pertinent to the research of this study can be summarised on the basis of the ISO 31000 framework and related guidance, as follows:

- **Integrated:** Risk management should be integrated throughout the 314rganization, not stand alone.
- **Structured and Comprehensive:** Productive and efficient risk management is fostered by a consistent and well-organized approach for the handling of risks with documented rules and processes.
- **Customised:** Risk management should be based on the organisation's internal and external context and objectives.
- **Inclusive:** Stakeholder involvement enhances the information base, self-awareness and helps inform risk decisions.
- **Dynamic:** Risks develop, shift and fade as circumstances develop and risk management should be prepared for and react quickly to these changes.
- **Best available information:** Risk decisions should be based on historical data, the latest evidence and forward-looking estimates, and explicitly recognise the limitations and uncertainties.

Human and cultural factors. How risks are perceived and managed are influenced by behaviour and culture at all levels and need to be taken into account during design and execution.

Project Risk Management

Project risk management is the systematic identification, quantification and handling of the uncertainty that impacts the project goals. As uncertainties are constantly changing during the project life cycle, it is essential to manage risks continually (Sahab et al., 2021). It starts by identifying the risks, then moves on to qualitative and quantitative risk assessments, and finally to an acceptable response system, with continued monitoring (Siddiquei et al., 2024). Without proper risk management, projects are exposed to potential contractual, financial, organisational, political and technical failures (Ahmad Bakri et al., 2021). Risk management can be considered a defensive practice that reduces the threats, as well as an offensive practice that leverages the

opportunities (Filippetto et al., 2021). The most popular process model consists of three legs: identifying risk, risk analysis, and risk response planning mitigations. While some standards like ISO 31000:2009 are now seen as flexible frameworks that will accommodate the characteristics of the project, the data quality, time constraints, and lack of contractor experience also severely limit the application of the standards (Ir Harry Sutanto & Ichsan, 2022).

Risk Identification

The most important step in risk management is Risk Identification – it is the step that gives rise to the remainder of the risk management process. Project teams record the characteristics of the risks and the potential impact, often starting with a brainstorming session made by the project manager in a structured way (Lameijer et al., 2021). Effective identification involves using various sources of information, structured tools and documentation in writing and not memory (Pekkala, 2024). It also takes a holistic approach as it looks for the root causes rather than the surface ones because addressing root causes in the end is what will solve recurring risks (Tamimi, 2021). This is typically done through cross-departmental brainstorming, extensive interviews with stakeholders, or structured surveys to gauge a cross-sectional view of risks (Al Qudah et al., 2024; Al-Mhdawi et al., 2025). Identified risks are increasingly being captured and visualised through risk management software (El Khatib et al., 2021).

Risk Assessment

After identifying the risk, it needs to be assessed. Risk assessment helps to identify and prioritize risks according to their severity and probability, and their relationship to other risks in the business. It is a structured approach to identify, assess and choose responses to threats and uncertainties. Without appropriate risk assessment, the necessary preventive measures to ensure the safety of the project may not be identified (Liao et al., 2023). Many risks are inherently qualitative, and quantitative approaches like probability-impact matrices and Monte Carlo simulations are commonly practiced in finance and engineering fields (Okudan et al., 2021; Tossapol et al., 2021). A risk map is used to plot the likelihood against the potential consequence and prioritisation is then made by the project manager and team, (Watfa et al., 2023). Risk assessment will be continuously carried out throughout the project life cycle if it is incorporated into the standard project tools charters, registers and treatment plans (Alzoubi, 2022; Ciric Lalic et al., 2022).

Risk Response and Risk Transfer

Risk response is the process of responding to the risks. The PMI identifies four general approaches to dealing with negative risks: avoidance, mitigation, transfer, and acceptance. Risk transfer is the third independent variable in the present study through which the risk is transferred to a third party, usually in the form of insurance, contractual clauses, or outsourcing agreements (Lukito et al., 2024). The literature on response strategy selection can be broadly divided in three categories: zonal-based in which the response strategies are mapped onto two dimensional risk matrices, trade-off and work-breakdown-structure (WBS) based approaches, and mathematical optimisation approaches in which the sum of expected loss and response cost is minimised given the budget and quality constraints (Imam & Zaheer, 2021; Malek & Bhatt, 2024). More recent works combine Bayesian network and dynamic Bayesian network with optimisation to model causal and temporal relationships between the risks of a project (Wu & Zhang, 2021). Although less analytically complex than these means of response, risk transfer is yet another method which is often used, especially if the risk is beyond the risk appetite of the organisation or technically feasible. The empirical question of this study is whether risk transfer as part of risk identification and risk assessment can make any meaningful contribution to the success of the project in the public sector in Pakistan.

The Concept of Project Success

Project success is the dependent variable in this study. The traditional "iron triangle" of cost, time, and quality has given way to a more expansive and multifaceted concept that includes long-term value, strategy alignment, and stakeholder satisfaction (Didraga, 2020). Badewi (2016) conceptualises success as the outcome of project management and benefits realisation; Chih and Zwikael (2015) link project success to organisational performance; and Carvalho and Rabechini (2017) offer a project sustainability model centred on benefiting society. Nevertheless, the iron triangle remains important and an objective measure albeit Jugdev and Müller (2005) argue that the iron triangle only represents about 60% of what is deemed project success. In other words, project efficiency is usually measured as meeting cost, time and scope goals, and project effectiveness measures stakeholder-defined business goals (Serrador & Turner, 2015). Berssaneti and Carvalho (2015) then break down quality into two components: satisfaction with the technical specification, and satisfaction with customer needs. According to Fortune and White (2006) and others, critical success factors are senior management support, the presence of a dedicated project manager, clear communication, and the presence of a competent team. Based on this multi-dimensional perspective on project success, the present study defines project success through five dimensions: schedule, budget, beneficiary use, sustainability, and stakeholder satisfaction.

Theoretical Foundation

Expected Utility Theory, Social Exchange Theory, and Transformational Leadership Theory are the three complementing ideas that constitute the basis of this study. Both provide an alternative viewpoint on how leadership behaviours and risk management procedures work together to produce project outcomes.

Expected Utility Theory

One of the basic theories of decision under uncertainty, Expected Utility Theory (EUT) was proposed by von Neumann and Morgenstern (1947). EUT gives a foundation to analyze risk identification and risk response choices in project management due to the fact that a project is an inherently uncertain endeavor (Committee et al., 2021; Kerzner, 2022). The framework is based on three axioms: (a) dominance (the principle that a better action should be preferred to a worse action), (b) transitivity (the consistency of preferences across actions), and (c) independence (the substitutability of equally valued outcomes) (Busemeyer, 2015). These axioms aid project managers in making disciplined decisions on risk-response options and validate the structured approach to risk management as a sensible reaction to uncertainty (Nauman et al., 2024).

Social Exchange Theory

According to Thibaut and Kelley (1959), Social Exchange Theory (SET) describes attitudes and behaviors in the workplace as being the exchange between the employee, the supervisor and the organization. SET is widely adopted to delve into the mechanisms by which transformational leadership impacts employees' turnover, helping behavior, creativity, and job satisfaction (Parsamehr et al., 2023). Trust, loyalty, and identification are key components of transformational leadership, as they encourage employees to put in more effort and be more committed, which in turn leads to a stronger social fabric that is crucial for the success of projects (Tse & Chiu, 2014; Sahab et al., 2021). In the context of risk management, SET implies that good risk identification, risk assessment, and risk response requires not only proper procedures but also a good social exchange among risk team members, which transformational leaders are in a better position to develop (Shah et al., 2018).

Transformational Leadership Theory

According to Bass's (1985) Transformational Leadership Theory, a leader must be able to inspire and encourage followers to develop trust, commitment, and creativity by going beyond self-serving objectives. Project factors such as engagement, creativity, and collaboration are closely related to project success and

are encouraged by transformational leaders. Transformational leadership has an impact on risk management because leaders who promote open communication and trust enable teams to identify, assess, and manage risks more effectively. Better risk management techniques, including decision-making, team cohesion, and a proactive approach to risk, have been associated with transformational leadership. Thus, the theory serves as the foundation for the study's proposed moderation effect, which holds that transformational leadership amplifies the impact of risk management techniques on project results.

Empirical Review and Hypotheses Development

Risk Identification and Project Success

Risk identification enables project teams to anticipate threats and opportunities early in the life cycle. Raz and Hillson Risk identification helps project teams to identify threats and opportunities upfront in the project lifecycle. Raz and Hillson (2015) believe that early identification has implications for more efficient resource allocation and more effective mitigation planning for downstream effects on project performance. Empirical evidence shows that a high level of maturity in project identification practices results in fewer interruptions and better project outcomes (Ir Harry Sutanto & Ichsan, 2022; Siddiquei et al., 2024). Smith et al. (2014) state that organisations that utilise standardised identification frameworkss like SWOT analysis or Delphi techniques have a higher success rate, and Baccarini and Archer (2021) reiterate the importance of integrated identification procedures for preventing projects from being delayed or costing overrun (Lameijer et al., 2021). Thus, the first hypothesis is:

H1a: There is a significant positive impact of risk identification on project success.

Risk Assessment and Project Success

Risk Assessment is a process of analysing possible risk to understand the likelihood and consequences of those risks to prioritise them. The use of quantitative and qualitative approaches such as probability-impact matrix and Monte Carlo simulation not only improve risk control, but also project performance (Hillson and Simon 2022) and systematic assessment decrease unforeseen obstacles (Raz et al. 2012). Moreover, Chapman and Ward (2023) indicate that assessment helps to increase proactive risk responses, which, in turn, enhances the effectiveness of projects (El Khatib et al., 2021; Watfa et al., 2023).

H1b: There is a significant positive impact of risk assessment on project success.

Risk Transfer and Project Success

PMI (2021) identifies risk transfer as one of the typical responses, involving insurance, contract or outsourcing. Research indicates that companies that have structured procedures for responding to projects have better project results and higher satisfaction among project participants (Lukito et al., 2024; Jääskä & Aaltonen, 2022). Proactive risk response is related to a higher probability of remaining on time, on budget, and on scope (Zwikael and Ahn 2021) and the embedding of risk response mechanisms, such as transfer, in project structures is associated with cost-effectiveness and sustainability (Purnus and Bodea 2019). Thus, the third hypothesis would be:

H1c: There is a significant positive impact of risk transfer on project success.

Moderating Role of Transformational Leadership

Transformational leadership fosters among its followers the desire to foster change in the work environment and come up with new ideas, in part by leading by example (El Khatib et al., 2021). Evidence indicates that in project-based organisations, transformational leadership fosters efficiency, performance, and project success (Tossapol et al., 2021). Transformational leadership has an indirect impact in the implementation of risk management practices. Transformational leadership is seen to have a positive impact on risk identification, assessment, and response by promoting teamwork and shared purpose (Zhang et al., 2022), while Aga et al. (2021) also demonstrate that transformational leaders are responsible for inspiring employee

involvement in risk management. Transformational leaders can help bridge the gap between the practice of risk management and project results by building trust, engaging the minds of team members, demonstrating individual consideration and communicating a great vision (Ciric Lalic et al., 2022; Wu & Zhang, 2021).

H2b: Transformational leadership moderates the relationship between risk assessment and project success.

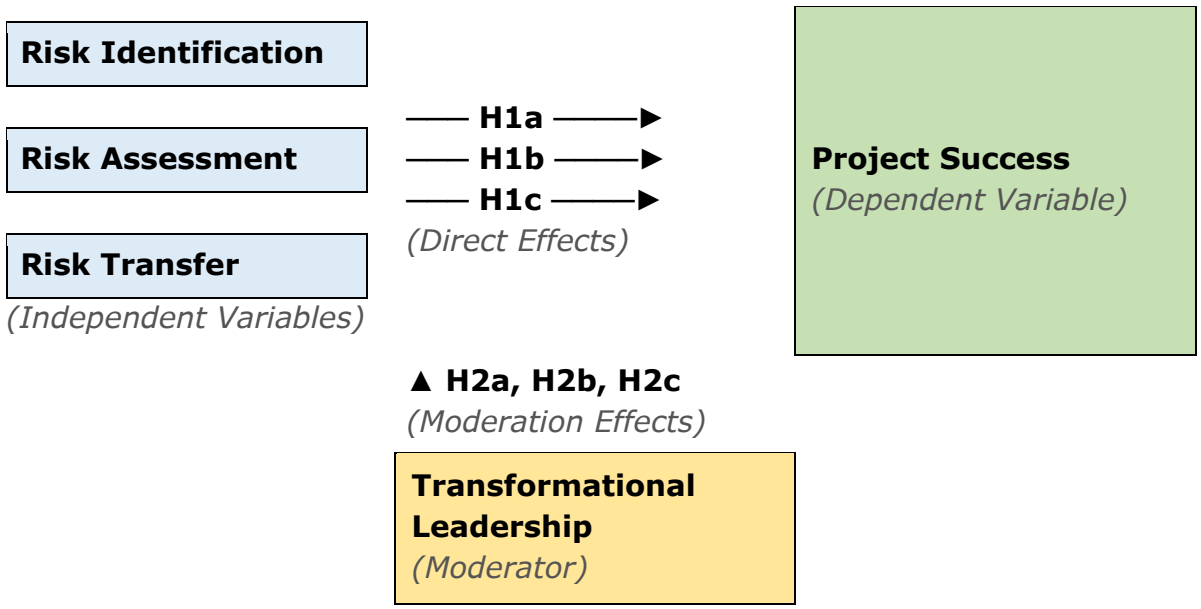
H2c: Transformational leadership moderates the relationship between risk transfer and project success.

Conceptual Framework

Based on the aforementioned theories and literature, the study suggests that three risk management practices—risk identification, risk assessment, and risk transfer—have a direct impact on project success, with transformational leadership acting as a moderator. Figure 1 summarises the model.

Figure 1

Conceptual Framework: Risk Management Practices, Project Success, and the Moderating Role of Transformational Leadership



Note: H1a, H1b, H1c test direct effects of risk management practices on project success. H2a, H2b, H2c test the moderating effect of transformational leadership on each direct path.

Methodology

Research Design

The study tests the moderating impacts of transformational leadership and the influence of risk management techniques on project success using a quantitative, cross-sectional, descriptive research approach. Using standardised Likert-scale tools and statistical inference to a specific population, a quantitative design enables the methodical measurement of hidden components. Descriptive research is appropriate since the goal of the study is to describe the relationship between constructs in a particular organisational context rather than to experimentally manipulate variables.

Population and Sample

The empirical setting for the study is a public-sector, project-based organisation in Pakistan the Cantonment Board Abbottabad (CBA) which is broadly representative of municipal-level project organisations in the country. CBA was founded in 1853 to provide municipal services and currently has around 348 permanent staff working in project-related positions across its various operational lines namely Survey, Engineering, Garden, Land and Sanitation (CBA, n.d.). It provides an empirical context in which to explore risk management and leadership dynamics in the public sector in Pakistan, where multi-stakeholder

accountability, budgetary controls akin to a donor, and bureaucratic processes are hallmarks. The unit of analysis is the individual participant in and/or interface with the public-sector projects in this organisation.

The sample size for this study was obtained using the Yamane's (1967) formula at 95% confidence level and 5% margin of error, and it was found to be 186. Convenience sampling has been employed as the population is located within the empirical site and is easily accessible via internal networks. Although there are known limitations associated with convenience sampling for generalisability, it is suitable for a study to gain insight into employee perceptions within a specific institutional context and serves as a steppingstone to future multi-organisational research.

Variables and Measurement

Validated Likert scale instruments with a range of 1 (strongly disagree) to 5 (strongly agree) were used to evaluate each component. Scales from Shibly, Louzi, and Hiassat (2013) were used to evaluate risk management practices: risk identification (9 items), risk assessment (8 items), and risk transfer (6 items). A scale developed by Aga and Vallejo (2016) was used to evaluate the project's success (14 items), which includes start-up performance, beneficiary usage, sustainability, schedule and budget adherence, and stakeholder satisfaction. The Vinger and Cilliers (2006) scale, which evaluates four elements of transformational leadership idealised influence, inspiring drive, intellectual stimulation, and individualised consideration was used to evaluate transformational leadership (13 questions). Table 1 provides a summary of the measurement scales.

Table 1

Variables Measurement

Variable	Source	Items
Risk Identification	Shibly, Louzi & Hiassat (2013)	9
Risk Assessment	Shibly, Louzi & Hiassat (2013)	8
Risk Transfer	Shibly, Louzi & Hiassat (2013)	6
Transformational Leadership	Vinger & Cilliers (2006)	13
Project Success	Aga & Vallejo (2016)	14

Data Collection Procedure

Project staff were asked to complete structured questionnaires during a specific data-collection period. All participation was voluntary and anonymous, and all participants gave informed consent. After screening for completeness, there were 186 questionnaires that were returned for analysis.

Data Analysis

The data were analysed using SPSS. The analytical process consisted of: (i) descriptive statistics for the demographic profile and central tendency of the constructs; (ii) reliability analysis of Cronbach's alpha; (iii) multicollinearity diagnostics of variance inflation factor (VIF); (iv) heteroscedasticity testing of Breusch-Pagan testing; (v) Pearson correlation analysis; (vi) multiple regression for direct effects (H1a – H1c); and (vii) hierarchical moderation analysis according to Cohen, Cohen, West and Aiken (2013) for H2a – H2c. To determine if there are any demographic variables to be controlled in the moderation analysis, a one-way ANOVA analysis was performed.

Ethical Considerations

Research ethics guidelines were followed in conducting the study. Participants gave their informed consent after being briefed about the study's objectives and their freedom to discontinue participation at any time. Responses were securely stored, the data collected was anonymous, and it was exclusively utilised for academic purposes.

Results and Analysis

Demographic Profile

The final sample of 186 employees has a reasonable distribution across age, gender, education, experience and marital status. From age distribution, it can be observed that 41.9% of the respondents are aged 31-40, 24.2% aged 20-30, 22.6% aged 41-50, and 11.3% aged 51 and above, reflecting that majority of the subjects surveyed are mid-career professionals. Gender profile is male dominant with 81.7% male respondents and 18.3% females, which is in line with the overall gender balance in project roles in public-sector in Pakistan. In terms of education, 51.1% have a bachelor, 27.9% a master or higher qualification and 21.0% have a high-school qualification, which is a generally well-educated sample. By tenure, 47.3% have 5–10 years of experience, 27.4% have more than 10 years, and 25.3% have less than 5 years. Marital status shows that 66.7% are married and 33.3% unmarried. The cross-tabulation of age and experience provides internal consistency: younger respondents (20-30) are grouped in the 'less than 5 years' experience category while older respondents (41 and above) are mostly in the 'above 10 years' experience category.

Descriptive Statistics

Table 2 presents the study's five constructs' means and standard deviations. All mean values are above 3.5, which means that the endorsement is broadly positive across the sample. Transformational leadership (M = 4.01, SD = 0.79), risk identification (M = 3.92, SD = 0.75), risk assessment (M = 3.85, SD = 0.72), and risk transfer (M = 3.78, SD = 0.68) were the next highest means, after project success (M = 4.08, SD = 0.74). The comparatively higher means for project success and transformative leadership and the slightly lower mean for risk transfer show that respondents think identification and evaluation are more crucial in modern practice than transfer.

Table 2

Descriptive Statistics

Variable	Mean (M)	Std. Deviation (SD)
Risk Identification	3.92	0.75
Risk Assessment	3.85	0.72
Risk Transfer	3.78	0.68
Transformational Leadership	4.01	0.79
Project Success	4.08	0.74

Reliability Analysis

All scales (shown in Table 3) have acceptable internal consistency, as evidenced by Cronbach's alpha values. The reliability of transformational leadership (0.87) and project success (0.85) are the highest, followed by risk identification (0.83), risk assessment (0.81), and risk transfer (0.79). All scales values are above the accepted value of 0.70 which is the conventional scale value requirement for subsequent analyses.

Table 3

Reliability Analysis (Cronbach's Alpha)

Variable	Cronbach's Alpha (α)
Risk Identification	0.83
Risk Assessment	0.81
Risk Transfer	0.79
Transformational Leadership	0.87
Project Success	0.85

Diagnostic Checks: Multicollinearity and Heteroscedasticity

Variance inflation factor (VIF) was used to check for multicollinearity. The VIF values of all predictors in the risk identification model (VIF = 2.53), risk assessment model (VIF = 2.15) and risk transfer mode (VIF = 1.98)

were not close to the 10 thresholds, which reveals that multicollinearity was not a problem. The Breusch-Pagan test for heteroscedasticity returned a non-significant result (statistic = 5.23, p = 0.072), suggesting constant error variance is reasonable. The model thus satisfies the standard OLS assumptions.

Correlation Analysis

The study constructs' bivariate correlation is displayed in Table 4. At the $p < 0.01$ level, every correlation is positive and statistically significant. Transformational leadership (r = 0.68) and risk identification (r = 0.64) had the strongest correlations with project performance, followed by risk assessment (r = 0.61) and risk transfer (r = 0.57). Given the comparatively high correlation between transformational leadership and project success, it is likely that the leadership variable will play a significant role in the moderation analysis.

Table 4

Correlation Matrix

Variable	PS	RA	RT	RI	TL
1. Project Success (PS)	1				
2. Risk Assessment (RA)	0.61**	1			
3. Risk Transfer (RT)	0.57**	0.52**	1		
4. Risk Identification (RI)	0.64**	0.56**	0.49**	1	
5. Transformational Leadership (TL)	0.68**	0.58**	0.53**	0.60**	1

*Note: **p < 0.01 (two-tailed).*

Regression Analysis

The direct effects of the three risk management practices on project success (H1a–H1c) were tested using multiple regression. Tables 5, 6, and 7 show the model summary, ANOVA, and coefficients.

Table 5

Regression Model Summary

Model	R	R^2	Adjusted R^2	Std. Error
1	0.72	0.52	0.51	0.52

The model explains 52% of the variance in project success (R^2 = 0.52, Adjusted R^2 = 0.51), indicating substantial explanatory power. The ANOVA confirms that the model is statistically significant (F = 65.92, p < 0.01).

Table 6

ANOVA

Source	Sum of Squares	df	Mean Square	F	Sig.
Regression	35.62	3	11.87	65.92	0.000
Residual	32.78	182	0.18		
Total	68.40	185			

Table 7

Regression Coefficients

Predictor	B	Std. Error	Beta (β)	t	Sig.
(Constant)	1.45	0.21	—	6.90	0.000
Risk Identification	0.33	0.05	0.39	6.60	0.000
Risk Assessment	0.29	0.06	0.34	4.83	0.000
Risk Transfer	0.25	0.07	0.28	3.57	0.001

Project success is positively impacted by all three factors in a statistically meaningful way. Risk assessment (β = 0.34, t = 4.83, p < 0.001) and risk transfer (β = 0.28, t = 3.57, p = 0.001) follow risk identification (β = 0.39, t = 6.60, p < 0.001). This indicates that H1a, H1b, and H1c are supported hypotheses. According to the relative magnitude, risk assessment and transfer are lesser but equally important incremental variables in the project's performance, whereas risk identification is the largest.

Moderation Analysis

Moderating role of transformational leadership (H2a–H2c) was tested using hierarchical moderated regression as suggested by Cohen, Cohen, West and Aiken (2013). In the moderation analysis, a one-way ANOVA of demographic variables was conducted, with gender being the only significant covariate (F = 2.677, p = 0.047).

Table 8

One-Way ANOVA for Control Variables

Variable	F	p-value
Age	1.267	0.261
Gender	2.677	0.047
Marital Status	0.251	0.861
Education	0.632	0.641
Experience	1.849	0.175

The hierarchical moderation analysis is shown in Table 9. Step 1 includes gender as a control. The main effects of the three risk management practices and transformational leadership are introduced in step 2, accounting for a significant additional portion of variance in project success (ΔR2 = 0.11, p < 0.01). Step 3 adds the three interaction terms (risk identification × transformational leadership, risk assessment × transformational leadership, and risk transfer × transformational leadership), resulting in a significant additional R^2 change (ΔR^2 = 0.09, p < 0.01).

Table 9

Moderation Analysis Results

Predictor	B	ΔR^2
Step 1 (Control Variable)		
Gender	0.02	
Step 2 (Main Effects)		
Risk Identification	0.33	
Risk Assessment	0.29	
Risk Transfer	0.25	
Transformational Leadership	0.38	0.11**
Step 3 (Interaction Effects)		
Risk Identification × TL	0.17	
Risk Assessment × TL	0.14	
Risk Transfer × TL	0.10	0.09**

*Note: **p < 0.01. TL = Transformational Leadership.*

All three of the interaction effects are significant, that is, the effect of each risk management practice on project success is amplified by transformational leadership. Hypotheses H2a, H2b, and H2c are therefore supported. The interaction with risk identification has the highest coefficient (B = 0.17), indicating that the influence of identification practices is most noticeable when combined with transformational leadership.

Hypothesis Testing Summary

The outcomes of each hypothesis are summarised in Table 10. All six theories have been supported by empirical findings, which demonstrate that risk management techniques directly improve project success and that transformational leadership amplifies the impact on Pakistan's public sector.

Table 10

Summary of Hypothesis Testing

Hypothesis	Result	Decision
H1a: RI → PS	$\beta = 0.39$, $p < 0.001$	Supported
H1b: RA → PS	$\beta = 0.34$, $p < 0.001$	Supported
H1c: RT → PS	$\beta = 0.28$, $p = 0.001$	Supported
H2a: TL moderates RI → PS	$\Delta R^2 = 0.09$, $p < 0.01$	Supported
H2b: TL moderates RA → PS	$\Delta R^2 = 0.09$, $p < 0.01$	Supported
H2c: TL moderates RT → PS	$\Delta R^2 = 0.09$, $p < 0.01$	Supported

Discussion and Conclusion

Discussion

The aim of the study was to determine how risk management techniques affect project success and how transformational leadership functions as a moderator in Pakistan's public sector. The findings offer compelling evidence in favor of an integrated model in which transformational leadership amplifies the effects of risk identification, risk assessment, and risk transfer, all of which communicate with one another and contribute to project success. Results supported all six hypotheses, converging evidence that disciplined risk management and competent leadership are at the heart of successful projects in the public sector.

This also supports the significant direct effect of risk identification on project success (H1a), as previously demonstrated by Raz and Hillson (2015), Smith et al. (2014), Baccarini and Archer (2021), which aligns with the notion that risk identification is the basis of risk management (Ir Harry Sutanto & Ichsan, 2022; Pekkala, 2024). Structured identification is useful for the managers in Pakistan's public sector where projects are distributed across several operational branches with varying project profiles, it helps them plan for the threats and resources accordingly. The relative strength of the effect of risk identification ($\beta = 0.39$) highlights the fact that the sooner that risks are identified, the greater the number of options for response. The findings on the significance of risk assessment (H1b) resonates with the findings by Hillson and Simon (2022), Raz et al. (2012) and Chapman and Ward (2023), which shows that the role of analytical rigour in risk prioritisation for response is significant. Risk transfer (H1c) though smaller in magnitude is significant and validates the findings of Zwikael and Ahn (2021), Purnus and Bodea (2019), and the overall PMI literature on the selection of response strategies. Transfer mechanisms such as insurance and contractual risk allocation are effective solutions for the public sector to pass risks outside the scope of their appetite.

The moderation results (H2a–H2c) are particularly noteworthy. Transformational leadership significantly strengthens the effect of each risk management practice on project success ($\Delta R^2 = 0.09$, $p < 0.01$). This aligns with the argument of Zhang et al. (2022), Aga et al. (2021), and Bass (1985) that transformational leaders are able to create an environment of trust, openness, and shared purpose that in turn improves the process of risk identification, assessment, and transfer materially (Wu & Zhang, 2021; Ciric Lalic et al., 2022). In the context of bureaucratic public sector settings, transformational leadership can be described as an enabling condition for moving formal risk management processes to engaged and risk-aware project delivery. The largest interaction coefficient (RI × TL: B = 0.17) further suggests that leadership matters most where collaborative, forward-looking thinking is required precisely the demands of effective risk identification. The results in theory give support to the Expected Utility Theory by proving that structured risk decision-making can improve project outcomes; to the Social Exchange Theory by proving that the trust

gained through transformational leaders can strengthen risk-related behaviours, and to the Transformational Leadership Theory by proving the moderation mechanism by which leaders amplify process-based interventions.

It is also noteworthy that the relative impact of risk transfer (β = 0.28) is comparatively low but still significant as compared to risk identification and assessment, which may be due to some structural constraints which are specific to the public sector of Pakistan. Public-sector organisations tend to be bound by strict procurement requirements, restricted access to the insurance market, and mandatory approvals from a bureaucracy that make it difficult to apply transfer solutions like outsourcing or risk allocation in contracts. This discovery suggests that risk transfer cannot be ruled out as a lesser approach but rather is one approach that needs regulatory facilitation and institutional support to be implemented. Policymakers and public sector administrators should thus think about setting up formal rules and regulations that enable proper risk transfer processes – especially for large infrastructure and development projects, where risks remain after the project is finished, and organisational capacity is limited.

Theoretical Implications

The results from this study also have implications for the way risk management effectiveness is thought of in terms of its boundary conditions. Most of the literature on project management is focused on the technical aspects of project management and does not directly address the human and relational aspects in which the processes are enmeshed. The present study seeks to challenge this assumption empirically by showing that with the same risk management practice, the outcomes are highly divergent with different quality of leadership. This implies that the effectiveness of risk management per se is dependent on the social and organisational context, in particular the way that the leaders establish a psychological safe environment, a culture of shared accountability and a proactive culture of risk. Theoretical models of project risk management should thus include leadership as a structural variable, and no longer as an exogenous factor, and thus progress towards a more socially situated perception of the functioning of risk processes in practice.

The study makes three contributions to theory. It first places research on risk management in Pakistan's under-represented public sector and shows how risk management techniques still make sense in this setting. Second, it provides a unified vision on the interconnections of rational decision making, social exchange, and leadership behaviour and the resulting project outcomes. Third, the empirical findings that transformational leadership moderates each of the three relationships between risk management and project success provide more detailed proof of the moderation results observed in earlier research that looked at the relationships between risk management and project success at the aggregate level of individual projects within the portfolio.

Managerial Implications

The results indicate a number of management implications:

- **Institutionalise Risk Identification:** In public sector project organisations, there is a need to include a systematic process of identifying risks in the beginning of the projects and keep it updated throughout the project lifecycle by using brainstorming, stakeholder interviews, and risk registers (Pekkala, 2024).
- **Strengthen Risk Assessment Capacity:** When qualitative and quantitative assessment tools are invested in, prioritisation and resource allocation improves (Okudan et al., 2021).
- **Use Risk Transfer Strategically:** Formal transfer mechanisms, such as insurance and contractual terms, are a useful addition to internal mitigation where risks are larger than organisational capacity (Lukito et al., 2024).
- **Cultivate Transformational Leadership:** Top management should think of transformational leadership as a strategic capability that increases the value of process-based risk management. Leadership

development programmes must explicitly focus on idealized influence, intellectual stimulation, individualized consideration, and inspirational motivation.

- **Integrate Leadership and Risk Processes:** Project governance arrangements should integrate leadership behaviour and risk management practice through joint training, shared risk review and accountability arrangements instead of considering them as separate functions.

Limitations

It's critical to acknowledge certain limitations. Strong causal inferences are further limited by the study's cross-sectional design; longitudinal research would offer a more comprehensive knowledge of how risk management techniques and leadership behaviours affect project outcomes over time. Second, the convenience sampling and the focus on a single empirical site restrict generalisability; therefore, in the future, it is recommended to test the model in other organisations, sectors and regions. Thirdly, the sample is heavily male (81.7%), which is in line with the gender composition in Pakistan's public sector, but restricts the demographical representativeness of the sample. Finally, all measures are self-reported in the present study, which may be subject to common method bias; future research should consider using multi-source or objective performance. Lastly, the study does not examine alternative moderators (e.g., other styles of leadership, project complexity and organisational culture) that may further delineate the context in which the relationship between risk management and project success is most pronounced.

Prospects for Further Research

Future research could take several paths building on this research. Longitudinal designs would help to understand the temporal dimensions of risk management and leadership influences. Generalisability and identification of contextual moderators would be done in cross-sector and cross-country comparisons. Research could also cover other risk response strategies, such as avoidance and mitigation, and acceptance, which could be combined with transfer, in order to provide a more comprehensive view of the effectiveness of risk response strategies. The survey data could be complemented by qualitative interviews to provide a more in-depth understanding of the practical implementation of risk management and leadership. Finally, future research could focus on boundary conditions, such as when transformational leadership is perceived as performative or risk transfer is limited by regulation and/or budget.

Conclusion

According to the empirical and conceptual conclusions of this study, risk identification, risk assessment, and risk transfer are actual factors that determine project success in Pakistan's public sector, and transformational leadership significantly improves these factors. Based on the ideas of Expected Utility Theory, Social Exchange Theory, and Transformational Leadership Theory, the study supports the integrated model that combines social exchange, inspiring leadership, and logical risk decision-making to produce successful project outcomes. The results underscore the critical need for disciplined risk management as well as transformational leadership capability throughout the public sector. With an increasing pressure of project demands from the public sector and a growing expectation from stakeholders, it is important for risk management and transformational leadership to be incorporated in everyday project execution to ensure value to organisations and communities served.

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Appendix

Questionnaire

All items were rated on a five-point Likert scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree.

Section A: Demographic Information

- Age: Below 25 / 25–35 / 36–45 / 46–55 / Above 55
- Gender: Male / Female
- Education: High School / Bachelor's / Master's and Above
- Experience (Years): Less than 5 / 5 to 10 / Above 10
- Marital Status: Single / Married / Divorced / Widowed

Section B: Risk Identification

- Your organisation has identified and applied procedures for the systematic identification of opportunities.
- Management tends to identify the losses associated with risks.
- Management tends to identify how and why risks arise.
- Management uses the experience of the organisation to identify risks.
- Management uses analytical processes to identify risks.
- Management uses scenario analysis to identify risks.
- Management tends to identify the area of risk impact.
- Management uses physical inspection to identify risks.
- Management tends to identify the risk's source.

Section C: Risk Assessment

- Your organisation analyses and evaluates opportunities to achieve objectives.
- Your organisation tries to identify the strengths and weaknesses of the risk management systems of partner organisations.
- Your organisation collates risks to support decision-making on appropriate actions.
- Risk is analysed according to likelihood.
- Risk is analysed according to consequence.
- Your organisation assesses risk using quantitative analysis methods.
- Risk is analysed according to reputation impact.
- Risk is analysed according to its effect on the achievement of objectives.

Section D: Risk Transfer

- Your organisation has a defined risk management plan.
- Your organisation considers limits in achieving risk management objectives.
- Your organisation evaluates the costs and benefits of identifying risks.
- Your organisation assesses the effectiveness of available controls and risk management responses.
- Management prioritises risks that cause significant losses.
- Your organisation maintains an up-to-date business continuity plan.

Section E: Project Success

- Projects I have been part of are usually completed on time.
- Projects I have worked on typically stay within the allocated budget.
- The results of our projects are effectively used by the intended beneficiaries.
- The project outcomes I have seen are likely to be sustainable.

- Project outcomes often lead to improved efficiency or effectiveness for end users.
- Our projects generally address the initial problem they were intended to solve.
- I am usually satisfied with the process of project implementation.
- Most team members I work with are satisfied with the project implementation process.
- The projects I have worked on have faced minimal start-up problems and are accepted by end users.
- Projects I work on often lead to improved performance for beneficiaries.
- Project results I have seen have a positive impact on the target beneficiaries.
- Project specifications are typically met when handed over to beneficiaries.
- Beneficiaries seem satisfied with the project outcomes.
- Principal stakeholders are generally satisfied with the outcomes of the projects I have been part of.

Section F: Transformational Leadership

- My supervisor instils complete faith in the team.
- My supervisor provides a compelling vision for the project.
- My supervisor encourages the team to view old problems in innovative ways.
- My supervisor gives personal attention to team members who seem overlooked.
- I am proud to be associated with my supervisor.
- My supervisor expresses confidence that project goals will be met.
- My supervisor provides fresh perspectives on challenging issues.
- My supervisor supports each team member in developing their strengths.
- My supervisor creates a positive environment that makes the team feel valued.
- My supervisor helps the team find purpose in their work.
- My supervisor challenges team members to re-evaluate previously unquestioned ideas.
- My supervisor is attentive to the unique concerns of each team member.
- My supervisor conveys optimism about the future success of the project.