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The Impact of Knowledge oriented leadership, transformational leadership, team empowerment and team performance in the software companies of Pakistan.

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Abstract

Purpose – Grounded in the Social Exchange Theory (SET), this endeavor investigates the impact of knowledge oriented leadership (KOL), transformational leadership (TL), and project success (PS). It further examines the mediating influence of team empowerment and team performance, uncovering their pivotal roles in increasing leadership effectiveness on project outcomes.

Design/methodology/approach – Empirical data were collected from 350 project professionals working within IT Sector, and the proposed model was rigorously tested using the Smart-PLS structural equation modeling technique.

Findings – The findings unveil that both TL and KOL significantly enhances project success, underscoring strategic value in project-based settings. Moreover, the mediating roles of team empowerment and team performance brighten critical pathways through which leadership styles exert their influence, emphasizing the importance of fostering cohesive and empowered teams for achieving superior project performance. The findings unveil a significant impact of TL on project success, with team empowerment and team performance playing crucial mediating roles in this relationship. In contrast, the impact of knowledge oriented leadership on project success was also found to be significant, however, the mediating roles of team empowerment and team performance between KOL and project success were remain statistically insignificant. These results underscore the pivotal role of leadership styles and team dynamics in augmenting project success while underscoring the limited influence of team outcomes between KOL and PS relationship in the software companies of Pakistan.

Originality/value – This endeavor offers novel insights into the substantial effect of leadership styles on project success. It highlights the leading role of transformational leadership in driving project outcomes through the mediating roles of team empowerment and team performance. In contrast, this endeavor reveals the limited influence of knowledge oriented leadership on project success through team outcomes. By emphasizing the significance of transformational leadership and the facilitating role of team dynamics, this endeavor contributes to the evolving discourse on leadership and team functioning in project-based settings. These outcomes offers actionable implications for leaders seeking to optimize team performance and realize project success.

Keywords: knowledge oriented leadership, transformational leadership; project success; team outcomes; Social Exchange Theory (SET)

1. Introduction

Project success remains a foundational topic in project management research, as it directly influences organizational competitiveness and stakeholder satisfaction. While traditionally defined by the "iron triangle" consisting scope, cost, and time, this narrow view has evolved (Wahab & Shaukat et al., 2023). Contemporary frameworks now recognize project success as a multifaceted construct, incorporating dimensions such as project planning, stakeholder contentment,

organizational efficiency, and long-term value creation (Aga et al., 2016; Latif & Nazeer et al., 2020; Lee et al., 2011; McLeod et al., 2012). This shift acknowledges the complexities of modern projects and underscores that traditional metrics alone are insufficient. Literature increasingly emphasizes the situational nature of success, shaped by methodologies, contextual factors, and critically, leadership styles (Schwalbe, 2015; Pacagnella et al., 2019; Wahab & Ali et al., 2023). Leadership is thus recognized as an indispensable organizational resource, guiding project teams toward achieving both immediate and strategic objectives (Galbreath, 2005).

The growing prominence of the Information Technology (IT) sector illustrates this dynamic. Software development projects are pivotal in shaping the global business landscape, driving innovation, and fostering societal progress (Dubey, 2011; Elmezain et al., 2021). Pakistan's IT sector exemplifies this trend, contributing over $2.8 billion annually, with $1.6 billion from software and IT services exports. This sector comprises over 2,500 registered firms, 25 tech incubators, and numerous collaborative workspaces, positioning it as a critical economic driver (Ahmed et al., 2012; Shahzad et al., 2017; TechJuice, 2015). To sustain this momentum, firms have embraced advanced project management methodologies, particularly in complex software projects integrating hardware, networks, and emerging technologies like artificial intelligence and blockchain (Desmond, 2017).

Despite its growth, the IT sector faces persistent challenges. These include underutilization of software functionalities, rapidly evolving customer expectations, and leadership deficiencies, which collectively hinder project outcomes (Mtsweni et al., 2016; Gartner, 2018; Manfreda & Štemberger, 2018; Wafa et al., 2022). Research highlights the urgency of identifying critical success factors and addressing systemic issues, such as poor leadership and inadequate stakeholder collaboration (Gartner, 2018; Wafa et al., 2022; Malik & Khan, 2021). Effective leadership practices have thus become central to overcoming these barriers and driving project success in a competitive, fast-paced environment (Jia et al., 2018).

Leadership's knowledge oriented and transformative roles is widely acknowledged, yet research has not fully explored its nuanced impacts on project performance. Specifically, there is limited focus on how leadership styles enhance team dynamics, such as engagement, collaboration, and knowledge sharing, which are crucial for achieving project goals (Byrne & Barling 2015; Muñiz Castillo & Gasper, 2012). Traditional leadership models often struggle to meet the demands of contemporary IT projects, characterized by their complexity and rapid technological advancements (Iqbal & Ahmad, 2021; Mabey et al., 2012; Moehler et al., 2018). In addition, the growing pressures of stakeholder participation and the imperative for sustainability call for leadership approaches that are both adaptable and visionary. In this context, knowledge-oriented leadership (KOL) and transformational leadership have emerged as powerful frameworks, emphasizing its influence on team outcomes and overall project success (Alharthi & Khalifa, 2019; Khalifa & Hewedi, 2016). Knowledge-oriented leaders focus on fostering a culture of learning, innovation, and knowledge sharing, which aligns organizational processes with the dynamic demands of stakeholders and sustainability goals (Farooq et al., 2021). Similarly, transformational leadership, characterized by its emphasis on vision, motivation, empowerment, trust and individualized consideration, inspires teams to transcend their immediate self-interests to drive performance and achieve the greater organizational goals (Aga et al., 2016). Together, these approaches offer the flexibility and foresight necessary to navigate the complexities of modern projects while delivering sustainable value. In the recent past practitioners have turned their attention to accessing the effect of knowledge oriented leadership and transformational leadership on project success (e.g. Siddiqui & Shaukat et al., 2023; Siddiqui & Shaukat, 2024). Nonetheless, the body of research to date has been somewhat fragmented, resultant in inconsistent outcomes and underlining significant gaps for a more comprehensive and consistent investigation of how these leadership styles influences project success (Afzal et al., 2018; Chaithanapat et al., 2022; Fareed et al., 2023; Zhang & Guo, 2019).

The Conservation of Resources (COR) Theory emphasizes that employees require psychological resources such as a sense of psychological safety and the ability to thrive in order to address workplace challenges effectively (Hobfoll, 1989). While COR theory underscores the significance of internal resource management and preservation, it offers a narrow scope in addressing the wider relational dynamics within organizational contexts. In contrast, the Social Exchange Theory (SET), grounded in the principles of reciprocity (Gouldner, 1960), offers a comprehensive framework for understanding how leadership practices shape employee outcomes through reciprocal exchanges (Blau, 1964). SET has gained considerable attention in leadership research, particularly in examining how leadership's knowledge oriented and transformative roles fosters employee outcomes through mechanisms like leader-member exchange and trust (Fan et al., 2023; Jaiswal & Dhar, 2017; Sharif et al., 2024). While psychological resources are indispensable, they alone cannot fully enable employees to realize optimal outcomes. A robust leader-follower exchange relationship is equally important. However, despite its widespread application, SET's potential to explore leadership's knowledge oriented and transformative influence on specific employee behaviors and their impact on performance outcomes remains underexplored (Ashfaq et al., 2023; Karakitapoğlu-Aygün et al., 2024). Particularly, there is limited understanding of how mediating factors such as team empowerment and team performance shape the connection between knowledge oriented and transformative leaderships and project success (e.g. for instance, Ali et al., 2020; Latif et al., 2020; Sahibzada et al., 2022).

Scholars like Siddiqui & Shaukat et al (2023) and Siddiqui & Shaukat (2024) recently highlighted the necessity of investigating the overlooked mechanisms that link various leadership styles to project success. They identified team dynamics including team empowerment and team performance as pivotal mediating factors requiring further attention. To address this gap, the present endeavor explores how these team-related variables mediate the relationship between leadership's knowledge oriented and transformative roles and project success. By integrating insights from SET theory, this endeavor extends beyond the COR framework, shedding light on the relational processes that increase the efficacy of leadership roles in driving project success. Consequently, our research questions are:

1. To what extent leader's knowledge oriented and transformative roles impacts project success?
2. Whether team dynamics (i.e. team empowerment and team performance) mediates the relationship between leadership styles and project success?

2. Theoretical background and hypotheses development

2.1 Leadership styles (TL and KOL) and project success

Leadership has long been recognized as a pivotal factor in augmenting organizational success (Bennis, 1999). It refers to the ability of an individual to influence, encourage, motivate, and enable followers to achieve collective goals. Effective leadership fosters a shared vision, inspires self-assurance, and facilitates teamwork, thereby influencing outcomes at individual, team, and organizational levels (Shaukat & Alam, 2023). Within the context of project management, leadership is particularly important, as it directly effects team dynamics, decision-making, and project success (Turner & Müller, 2005). Among the diverse leadership paradigms, transformational leadership (Siddiqui & Shaukat, 2024) and knowledge oriented leadership (Sahibzada et al., 2021) have emerged as influential styles that significantly shape project outcomes.

TL inspires and motivates individuals to align their objectives with a higher purpose or vision (Bass & Avolio, 1985). Leaders engaging this style focus on intellectual stimulation, individualized consideration, idealized influence, and inspirational motivation. TL drive innovation, foster creativity, and build strong emotional ties with their teams, supporting them to achieve superior performance (Aga et al., 2016). In the realm of project management, TL is particularly relevant as it heightens team cohesion and encourages adaptability in response to

changing project requirements (Nauman et al., 2024). On the other hand, knowledge oriented leadership (KOL) emphasizes on the knowledge creation, sharing and utilization within organizations (Kianto et al., 2019). Leaders engaging this style fostering an environment of learning, innovation, and continuous improvement. KOL focuses on creating systems and processes that facilitate knowledge exchange, thereby enhancing organizational effectiveness (Sahibzada et al., 2021). In project based settings, KOL has been linked to improved decision making, effective resource management, and enhanced project performance (Siddiqui & Shaukat et al., 2023).

TL has been emerged as a pivotal factor of project success in contemporary project management research. Numerous studies have been conducted to scrutinize this relationship, highlighting the significant ways in which TL influences PS. For instance, scholars like Aga et al. (2016) explore the relationship between TL and PS and found it significant. They further affirmed that TL positively effects critical project dimensions including cost, time, scope and quality, largely through its impacts on team building. Besides, Ali and Rasheed (2020) stated that TL facilitates effective communication and trust-building, enabling project teams to manage challenges and adapt to uncertainties inherent in project settings. Likewise, Ahmad et al. (2022) scrutinized the impact of TL on project success and reported that TL contributes to project performance by fostering trust, motivation, trust and collaboration among project team members. In addition, Afzal et al. (2018) demonstrated that TL enhance stakeholder engagement and satisfaction, which are crucial determinants of PS. Moreover, Siddiqui and Shaukat (2024) conducted a study on the link between TL and PS. They found that TL positively influences PS by improving team commitment and aligning team efforts with project objectives. These prior research consistently support the notion that TL plays a positive role in driving project success through effective leadership practices.

KOL has also been emerged as a pivotal factor in project success within contemporary project management research. Leaders who adopted this style prioritize knowledge centric culture that drives innovation and supports strategic decision making, both of which are indispensable for project success (Donate & de Pablo, 2015). Numerous studies have been conducted to scrutinize this association, highlighting the significant ways in which KOL impacts PS. For instance, scholars like Al-Hakim and Hassan (2016) inspected the role of KOL in driving project success and found that KOL nurtures a culture of knowledge sharing and innovation, which positively enhances team performance and project outcomes. Besides, Sahibzada et al. (2021) explored the impact of KOL on PS and discovered that leaders who focus on knowledge creation and dissemination positively affect team capabilities, leading to more efficient project execution. Likewise, Latif et al. (2021) affirmed that KOL has a substantial effect on project success. Their findings highlighted that KOL fosters collaborative culture which enable teams to leverage collective expertise to address project challenges efficiently. Moreover, the study conducted by Mariam et al. (2022) confirmed a significant inference between KOL and project success, underscoring how leaders who prioritize the systematic management of knowledge substantially influence project outcomes. These prior research consistently support the notion that KOL plays a positive role in driving project success through effective leadership practices. Consequently, we set the following hypotheses:-

H1: There is a significant effect of transformational leadership on project success.

H2: There is a significant effect of knowledge oriented leadership on project success.

2.2 Mediating role of team empowerment

Team empowerment is a cornerstone of operational project management, facilitating project teams to navigate complex situations and make timely, informed decisions (Mathieu et al., 2006). Empowered teams are adept to manage operational challenges and actively shape governance and managerial decision making processes. Gerster et al. (2018) emphasized that the empowerment of project teams significantly contributes to realizing superior project outcomes.

In the realm of IT projects, team empowerment emerges as an energetic enabler of agility and innovation, driving success in fast-paced environments. Key characteristics of empowerment, such as potency, meaningfulness, and autonomy, play crucial roles in determining team success (Kirkman & Roser, 1999). Potency reflects the collective confidence of project teams in their ability to make impactful decisions, while meaningfulness underlines the relevance and value of their tasks in realizing project objectives. Autonomy, highlights the extent of independence and control granted to project teams, which fosters innovation and strengthens collaborative efforts among team members (Dikert, 2016). Empowering teams within projects boosts their productivity and drives successful consequences. Moreover, Moe et al. (2019) asserted that team empowerment serves as an important pillar of effective project management, reinforcing its importance in delivering project success through improved team cohesion and decision making efficacy.

Existing research underscores the crucial role of team empowerment as a pivotal mechanism in project management, mainly in understanding the pathways through which leadership styles impact project outcomes. Team empowerment has been found to mediate the relationship between knowledge oriented leadership, transformational leadership, and project success. For instance, the study of Jha (2014) revealed that psychological empowerment plays a significant mediating function in the link between leadership practices and performance outcomes. The scholar further emphasized that project teams empowered through knowledge oriented and motivational leadership contributing to enhanced superior organizational performance. Besides, Birkinshaw (2018) indicated that leadership play a crucial role in empowering their team members by delegating power and cultivating an atmosphere that prioritizes participative decision-making in project activities. This scheme not only deepens the engagement and decision taking abilities of team members but also contributes to the achievement of project success (Tian et al., 2015). Likewise, Sanjaghi et al. (2012) explored how team empowerment influences the connection between TL and firm performance, revealing that it serves as a critical mediator in strengthening this relationship. In addition, Abualoush et al. (2018) highlighted that team empowerment acts as a vibrant enabler of KOL, nurturing circumstances that drive successful project outcomes. Similarly, Schermuly et al. (2013) examined the influence of leadership on PS through the facilitating mechanism of team empowerment and reported a positive relationship. In the context of enterprise resource planning projects, Khattak et al. (2020) established that knowledge based leadership effectively promotes empowerment and innovative teamwork, which in turn leads to greater project success rates. Moreover, Zahur et al. (2022) found that both team empowerment and innovative work behaviors serve as critical mediators, strengthening the connection between effective leadership practices and project success. These research collectively underscore the integral role of leadership styles in shaping empowered teams and fostering the conditions necessary for successful project execution. Consequently, we set the following hypothesis:

H3: Team empowerment mediates the link between transformational leadership and project success.

H4: Team empowerment mediates the link between knowledge oriented leadership and project success.

2.3 Mediating role of team performance

Team performance has been emerged as a cornerstone of corporate success, with its deeply embedded application in effective project management practices. Patrashkova et al. (2013) emphasized that consistent communication plays a pivotal role in fostering operative information sharing among project teams, ultimately enhancing team performance and driving the success of information technology projects. Scholars such as (Ozigbo et al., 2020) stated that cohesive project teams, leveraging complementary skills and proficiencies, play a key function in delivering quality-driven outcomes and achieving strategic organizational goals. Effective project leadership has become instrumental in nurturing these teams, guiding them through several developmental

stages, and fostering an atmosphere conducive to collaboration and mutual growth (Burke et al., 2017).

Teamwork has evolved into a critical and sophisticated skill important in modern workplaces, driven by the integration of numerous dynamic factors (Latif & Williams, 2017; Shaukat et al., 2022). High-performing project teams, supported by proficient leadership, are more prepared to meet project goals and drive organizational excellence. Besides, researchers like (Hongwei and Yansong, 2021) emphasize that leader's impact team performance and also shaping outcomes through planned team development initiatives. Leadership play a key function in aligning team capabilities with project demands, ensuring optimal performance. In particular, Knowledge oriented leadership focus on fostering a culture of learning, creativity, and knowledge sharing, which aligns organizational processes with stakeholders' demands and sustainability goals (Farooq et al., 2021). Similarly, transformational leadership enhance team performance by cultivating a collaborative and supportive working culture, ultimately resulting in successful project completion (Siddiqui & Shaukat, 2024).

Existing research underscores the crucial role of team performance as a pivotal mechanism in project management, mainly in understanding the pathways through which leadership styles impact project outcomes. Team performance has been found to mediate the relationship between knowledge oriented leadership, transformational leadership, and project success. For instance, the study of Lee et al. (2011) revealed that team performance elements including team cohesion and job satisfaction play a significant mediating function in the link between leadership practices and performance effectiveness. Besides, Imam and Zaheer (2021) highlighted the mediating role of team outcomes in the relationship between shared leadership behavior and project success. The findings reflected that leadership directly influences project success whereas team dynamics mediated this relationship. Likewise, Zada et al. (2024) found that leader's improves project management effectiveness by boosting team performance and fostering cohesion, which mediates the relationship between leadership practices and project outcomes. The findings further highlighted that leader's dedication to supporting their teams' leads to enriched project quality and successful outcomes. In addition, Mariam et al. (2022) emphasized the mediating role of team cohesion in the relationship between KOL and project success. The results highlighted that team cohesion partially mediates how KOL influences project outcomes. Moreover, a study hypothesized the influence of leadership on team building and project success, revealing that team building significantly enhances the relationship between transformational leadership and project success (Aga et al., 2016). These research collectively underscore the integral role of leadership styles in shaping team performance and fostering the conditions necessary for successful project execution. Consequently, we set the following hypothesis:

H5: Team performance mediates the link between transformational leadership and project success.

H6: Team performance mediates the link between knowledge oriented leadership and project success.

Social Exchange Theory (SET) provides a vigorous framework to understand how leadership styles, including transformational and knowledge oriented leadership, influence project success through mediators of team empowerment and team performance. According to SET, exchanges between leadership and team members are administered by a reciprocal exchange process, where leaders provide support, guidance, and empowerment, while followers provide commitment, engagement, and effort in return Blau, 1964). This theory emphasized that workplace affiliations are built on trust, mutual benefit, and reciprocity, which influences the outcomes of collaborative efforts, such as project success (Gouldner, 1960).

In the context of transformational leadership, leaders stimulate their followers by fostering a vision, promoting individualized consideration, and stimulating intellectual engagement (Bass & Avolio, 1985). SET suggested that through these behavioral practices, TL creates an atmosphere where team members feel empowered and valued, encouraging a reciprocal exchange of effort and

commitment (Siddiqui & Shaukat, 2024). This leads to heightened team empowerment and team performance. As a result, TL positively effects project success by stimulating effective team collaboration, problem solving, and decision making, all facilitated through empowered teams. Likewise, knowledge oriented leadership focuses on creating a knowledge intensive environment, where leaders encourage the conversation of expertise and nurture a culture of continuous learning (Kianto et al., 2019). KOL aligns well with SET theory, as it accentuates the exchange of knowledge and intellectual capital between leaders and followers. KOL's support for team empowerment and team performance enables them to make informed decisions, work together effectively, and implement creative solutions. SET suggested that the mutual benefits derived from the leader and follower relationship, where both leaders and team members work toward shared goals, significantly contribute to realizing project success.

3. Methodology

3.1 Sample and procedure

The present research applied a quantitative, cross-sectional research design, and managed survey research to discover the relationship between leader's knowledge oriented and transformative roles, team outcomes and project success. Grounded on quantitative research, we systematically gathered and assessed the data to recognize patterns and associations between these variables. The study primarily focused on IT professionals working in Pakistan, including national and international organizations. IT firms are indispensable to the economic advancement of developing countries (Wahab & Ali et al., 2023). In Pakistan, where technical advancement is progressively linked to economic evolution, successful completion of software projects has emerged as a critical area of attention (Siddiqui & Shaukat, 2024). This shift emphasizes a growing importance on adopting effective leadership practices within these firms to boost project success. Data collection was completed through a structured questionnaire managed during regular working hours.

A convenience sampling technique was employed, distributing a total of 500 questionnaires to potential respondents. Out of these, 350 responses were completed adequately for analysis, achieving a strong response rate. The remaining 38 responses were discarded owing to incomplete answers, but the data from the 350 usable questionnaires were fully intact and related to the current research constructs. Respondents for this research included project team members whose roles are critical to the success of agile projects, and this focus allowed for a detailed investigation into how leadership factors influence project outcomes. The demographic characteristics of the participants reveal that the sample consisted of 308 male and 42 female participants. Age distribution varied, with the majority of respondents falling into the 31-40 years age group. Respondents' educational backgrounds were classified into intermediate to PhD degrees, with a noteworthy majority possessing a bachelor's degree. Professional experience was classified into three distinct categories: 1-5 years, 6-10 years, and over 10 years, with the majority of respondents having more than a decade of experience.

3.2 Measures

Information Technology experts were given questionnaires in order to gather reliable information, and a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) was used to collect their answers. Using validated measures, this study looked at a number of key variables. This method offered an organized framework for investigating how important variables affect project success in the IT sector.

Knowledge oriented leadership: It is the first independent variable for the present study, and was meticulously measured using a 6-item scale taken from (Donate & De Pablo, 2015).

Transformative leadership: It is the second independent variable for the present study, and was meticulously measured using a 14-item scale taken from (Aga et al., 2016).

Project success: It is the primary dependent variable, which was evaluated with a 14-item scale adopted from (Aga et al., 2016).

Team empowerment: The first mediator variable is team empowerment, which was measured using a 6-item scale taken from (Spreitzer, 1995).
Team performance: The second mediator variable is team performance, which was evaluated with a 4-item scale based on the work of (Marrone et al., 2007).

3.3 Data analysis procedure

In this research, the SPSS tool was employed to process and evaluate the collected data. The data set was entered precisely into SPSS package and a detailed screening procedure was also undertaken. Only the data set which was cleaned and appropriate fit for more analysis was kept. For model evaluation we employed Smart-PLS tool. For explanation purposes of the questionnaire responses given by the respondents, PLS-SEM was performed, which is a well-structured approach, also preferred in social sciences to deal with complicated relations (Hair et al., 2014). PLS-SEM attracted popularity in leadership research due to the fact that it helps in the inferences of research findings and the complexities of associations in leadership as well (e.g. Shaukat & Alam, 2024; Siddiqui & Iqbal et al., 2023).
The present study involved the application of PLS-SEM to study the incredibly complex link among the variables. The PLS-SEM procedure was distributed into two crucial phases: measurement model testing and structural model assessment. In the initial phase, measurement models were tested thoroughly for constructs reliability and validity. The loadings were inspected to retain only the most substantial indicators in order to enhance the model specification. Various reliability estimates, including Cronbach's alpha and composite reliability, were applied to establish the internal consistency of the constructs. Examinations of convergent validity validated a significant likelihood for an association in related indicators. Discriminant validity assures that the constructs are distinctive from one another and do not relate excessively with each other. Such estimates gave an incredibly vigorous empirical basis for the research model (Ringle et al., 2020). In the followed phase, the study undertake the evaluation of structural models where the strength and direction of each hypothesized relations are showed through path coefficients. The bootstrap procedure in SmartPLS tool was employed to appraise the path coefficients significance. Bootstrapping technique allows scholars to draw inferences concerning the direct and indirect impacts of independent variables on dependent variables. This dual-stage approach gives insights into the underlying mechanisms and correlations within the existing research model.

4. Findings

The current research outcomes are delineated into two distinctive parts: initially, the delineation of the measurement model and then the estimation of the structural model (Figure 1 & Figure 2).

4.1 Measurement and structural model

To begin with, we concentrated on investigating the measurement model to understand the research variable such as knowledge oriented leadership, transformative leadership, team empowerment, team performance and project success. We used many ways to evaluate the suggested model such as loadings, alpha, reliability and assessment of convergent and discriminant validity (Siddiqui & Qureshi et al., 2024; Shaukat & Alam, 2023). Usually, loadings with values above than 0.5 are considered satisfactory (Gefen & Straub, 2005). The findings reflected that all items meet the acceptance standards. Also, alpha is an esteemed indicator of internal consistency among multiple items, which is normally desires to be greater than 0.7 (e.g. Nunnally, 1978). The findings reflected that all the variables confirmed vigorous alpha statistics. Besides, composite reliability should meet the criteria of 0.7, and the results lies within the prescribed limit. A detailed outcomes are presented in Table 1.
In order to establish convergent validity, we used Average Variance Extracted with the assertion that scores equaling or exceeding 0.5 are acceptable. It was confirmed that all the study's constructs in the analysis met this criteria to further verify the existence of the convergent validity. Discriminant validity was assessed in a more complex manner mainly by means of Fornell-Larcker criteria and heterotrait-monotrait (HTMT) ratio and cross loadings analysis (Henseler et al., 2015;

Fornell & Larcker, 1981). According to standards set by the HTMT ratio, the value of a construct should ideally be below 0.9 and the study established all the variables fell within this range limit. Besides, this study affirm the Fornell-Larcker criteria by establishing that the square root of AVE for each construct was greater than the correlations it had with the other available constructs. Moreover, cross loadings showed that all loadings of the respective construct were substantially higher than those of other constructs. The detailed representation of results are given in Tables 2 to 4 accordingly.

In this study, we assessment the structural model according to one of the guidelines proposed by Hair et al. (2017) which highlights that one should perform an appraisal of the model R^2 value and Q^2 value in a systematic manner. The coefficient of determination (R^2) refers to the ratio that defines the endogenously latent variable as determined by the corresponding hypothetical constructs engaged in the latter model (Hair et al., 2017). To begin with R^2, we assessed the predictive power of the model through the statistics of Q^2 in the blindfolding procedure. The calculation of this measure reveals the extent to which a model predicts the values of the endogenous variables and in doing so this measure reveals the degree of out-of-sample predictive validity. Consistent with the guidelines provided by Stone (1974), Q^2 values of greater than zero support the relevance of the model while negative values imply that this model was inapt in predicting accuracy. Empirical estimates indicated that R^2 estimates satisfy the given criteria. In addition, the values of Q^2, reflected in Table 5, were well above 0 and affirms statistically valid models.

4.2 Hypotheses testing

We evaluated the direct and indirect associations among the variables to determine the study hypothesis. H1 examined that whether transformational leadership (TL) has a significant effect on project success (PS). The results witnesses that TL has a strong effect on PS, hence affirming H1 hypothesis. Similarly, H2 evaluated that whether knowledge oriented leadership (KOL) has a significant effect on project success (PS). The results witnesses that the effect of KOL on PS remain significant. In addition, we assessed the mediating role of two team-related parameters including team empowerment and team performance (H3~H6) in the relationship between leadership styles and project success. We used bootstrapping approach in SmartPLS-4 to thoroughly assess these intervening effects.

The mediating role of team empowerment and team performance in the relationship between TL and PS has been assessed separately. For H3, the analysis indicated that the indirect effect of TL on PS was significant through team empowerment. The total effect of TL on PS was also positive. With the addition of mediating variable team empowerment, the findings reveals that there is a significant effect of TL on PS. For H5, the analysis indicated that the indirect effect of TL on PS was significant through team performance. The total effect of TL on PS was also positive. With the addition of mediating variable team performance, the findings reveals that there is a significant effect of TL on PS. These findings support the hypotheses H3 and H5 reflecting towards complementary partial mediation.

Similarly, the mediating role of team empowerment and team performance in the relationship between KOL and PS has also been assessed separately. For H4, the analysis indicated that the indirect effect of KOL on PS was insignificant through team empowerment. The total effect of KOL on PS was remained positive. With the addition of mediating variable team empowerment, the findings reveals that there is a significant effect of KOL on PS. For H6, the analysis indicated that the indirect effect of KOL on PS was insignificant through team performance ($\beta= 0.09$, $t= 1.97$, $p< 0.02$). The total effect of KOL on PS was also positive ($\beta= 0.56$, $t= 13.51$, $p< 0.00$). With the addition of mediating variable team performance, the findings reveals that there is a significant effect of TL on PS ($\beta= 0.10$, $t= 2.00$, $p< 0.02$). These findings does not support the mediating role of hypotheses H5 and H6 reflecting towards no mediation. The results are presented in Table 6.

Table 1: Loadings, Alpha, CR, and AVE

Construct	Item	Loading	Alpha	CR	AVE
Transformational leadership	TL1	0.699	0.910	0.917	0.505
	TL2	0.630			
	TL3	0.551			
	TL4	0.665			
	TL5	0.719			
	TL6	0.674			
	TL8	0.717			
	TL9	0.736			
	TL10	0.699			
	TL11	0.836			
	TL12	0.757			
	TL13	0.701			
Knowledge oriented leadership	KOL1	0.857	0.881	0.886	0.629
	KOL2	0.812			
	KOL3	0.822			
	KOL4	0.715			
	KOL5	0.796			
	KOL6	0.746			
Team empowerment	TE1	0.745	0.862	0.863	0.592
	TE2	0.807			
	TE3	0.813			
	TE4	0.737			
	TE5	0.770			
	TE6	0.739			
Team performance	TP1	0.812	0.843	0.845	0.680
	TP2	0.822			
	TP3	0.840			
	TP4	0.825			
Project success	PS1	0.750	0.941	0.942	0.567
	PS2	0.748			
	PS3	0.685			
	PS4	0.717			
	PS5	0.779			
	PS6	0.766			
	PS7	0.731			
	PS8	0.742			
	PS9	0.676			
	PS10	0.755			
	PS11	0.815			
	PS12	0.770			
	PS13	0.809			
	PS14	0.783			

Table 2: Fornell-Larcker criterion

Constructs	KOL	PS	TE	TP	TL

Knowledge oriented leadership	0.793				
Project success	0.54	0.753			
Team empowerment	0.494	0.67	0.769		
Team performance	0.468	0.725	0.667	0.825	
Transformational leadership	0.65	0.665	0.712	0.634	0.71

Table 3: HTMT ratio

	KOL	**PS**	**TE**	**TP**	**TL**
Knowledge oriented leadership					
Project success	0.593				
Team empowerment	0.563	0.741			
Team performance	0.539	0.812	0.781		
Transformational leadership	0.728	0.715	0.792	0.709	

Table 4: Cross loading analysis

Items	KOL	PS	TE	TP	TL
KOL1	0.857	0.481	0.45	0.42	0.616
KOL2	0.812	0.45	0.43	0.376	0.501
KOL3	0.822	0.449	0.395	0.345	0.506
KOL4	0.715	0.396	0.311	0.326	0.46
KOL5	0.796	0.398	0.371	0.367	0.473
KOL6	0.746	0.388	0.38	0.385	0.524
PS1	0.404	0.75	0.521	0.584	0.507
PS10	0.391	0.755	0.511	0.556	0.484
PS11	0.424	0.815	0.557	0.57	0.504
PS12	0.404	0.77	0.487	0.55	0.469
PS13	0.467	0.81	0.533	0.586	0.537
PS14	0.421	0.784	0.532	0.605	0.523
PS2	0.362	0.748	0.469	0.513	0.445
PS3	0.433	0.685	0.433	0.458	0.436
PS4	0.427	0.717	0.481	0.504	0.516
PS5	0.414	0.779	0.501	0.527	0.483
PS6	0.415	0.767	0.47	0.566	0.501
PS7	0.376	0.731	0.554	0.564	0.535
PS8	0.391	0.742	0.537	0.523	0.558
PS9	0.363	0.677	0.463	0.522	0.501
TE1	0.373	0.537	0.745	0.577	0.56
TE2	0.396	0.526	0.807	0.482	0.525
TE3	0.366	0.538	0.813	0.525	0.561
TE4	0.33	0.457	0.737	0.469	0.556
TE5	0.453	0.564	0.771	0.535	0.574
TE6	0.355	0.459	0.739	0.481	0.503
TP1	0.301	0.566	0.552	0.812	0.47
TP2	0.386	0.616	0.532	0.822	0.515
TP3	0.421	0.616	0.566	0.84	0.546
TP4	0.426	0.592	0.55	0.825	0.555
TL1	0.561	0.469	0.464	0.321	0.699
TL10	0.54	0.591	0.679	0.594	0.836
TL11	0.46	0.504	0.547	0.475	0.757
TL12	0.387	0.47	0.542	0.538	0.718
TL13	0.443	0.51	0.533	0.532	0.701
TL2	0.452	0.445	0.363	0.344	0.63
TL3	0.438	0.404	0.417	0.391	0.651
TL4	0.416	0.413	0.432	0.321	0.665
TL5	0.473	0.484	0.482	0.4	0.719
TL6	0.486	0.474	0.434	0.408	0.674
TL8	0.455	0.417	0.528	0.521	0.717
TL9	0.452	0.46	0.558	0.457	0.736

Table 5: Coefficient of determination and predictive relevance

Constructs	R2	Q2
Project success	0.624	0.313
Team empowerment	0.314	0.30

Team performance	0.298	0.290

Figure 1: Measurement model

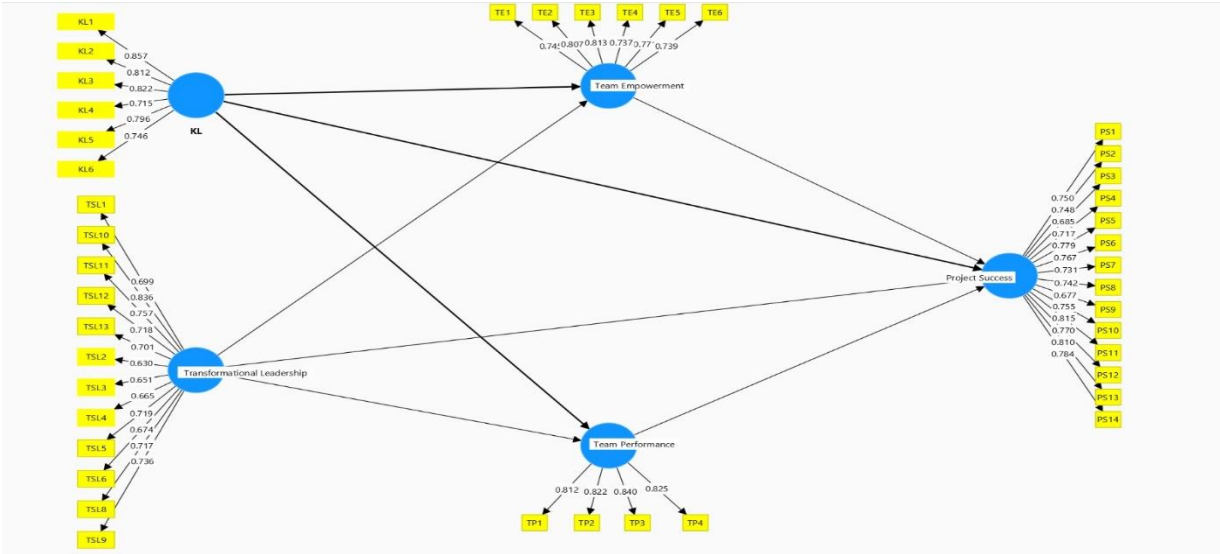

Table 6: Hypotheses Testing

Direct effect				
	Beta	**T value**	**P value**	**Decision**
H1: TL->PS	0.16	2.30	0.010	Supported
H2: KOL->PS	0.13	2.59	0.005	Supported

Mediation effect										
	Total effect			**Direct effect**				**Indirect effect**		
	Beta	T	P	Beta	T	p	Hypotheses	Beta	t	p
TL->PS	0.54	9.40	0.000	0.16	2.30	0.010	H3:TL->TE->PS	0.14	2.92	0.002
							H4:TL->TP->PS	0.24	6.62	0.000
KOL>PS	0.18	2.75	0.003	0.13	2.59	0.005	H5:KOL->TE->PS	0.01	0.64	0.261
							H5:KOL->TP->PS	0.04	1.26	0.103

5. Discussion

In the recent years, a significant shift has been seen in leadership studies, which underlines the styles of leadership that successfully tap into the potential of employees in the dynamic project settings (Siddiqui & Iqbal et al., 2023; Latif & Nazeer et al., 2020). Using the guidelines of Social Exchange Theory (SET), this research further develops the trend of leadership by discovering the effect of transformation and knowledge oriented leadership on the success of projects. The primary objective of this initiative was to assess the impact of both TL and KOL on project outputs directly, while the mediatory role of team dynamics, mainly team empowerment and team performance, in this relationship had to be taken into account. The findings of the current research confirm that both TL and KOL contributes to the success of projects and provides useful evidence of the

mechanisms through which that TL impacts. Theoretical contributions and practical implications derived from the findings of the study are discussed in the following sections.

5.1 Theoretical contributions

This research significantly advances the literature on leadership and project success by confirming the impactful roles of both transformational and knowledge oriented leadership in augmenting project success. Prior research has highlighted the potential of these leadership styles to influence PS (Aga et al., 2016; Siddiqui & Shaukat et al., 2023), but this study provides empirical validation, reinforcing the assertion that both TL and KOL positively impact project outcomes. The findings not only support established theories but also introduce a deeper comprehension of how leadership behaviors contribute to project success within leadership and project management disciplines. This outcomes adds clarity to the extant literature by ratifying that both TL and KOL leadership directly promoted successful project execution by evolving a supportive and empowering work environment.

The second, significant contribution of this research lies in the incorporation of Social Exchange Theory (SET) to explain the relationship among leadership styles, team dynamics and project success. SET has long been applied to understand interpersonal and organizational dynamics, yet its application to project management research, especially in the context of leadership, remains underexplored (Rehman & Zeb, 2023). SET, with its foundation in reciprocal interactions (Blau, 1964), offers an important lens through which the relationships between transformation and knowledge oriented leadership, and project outcomes are examined. In this research, SET helps to explain how the leadership behaviors and supports are not only directed towards improving team performance but also build a foundation of trust, commitment, and shared benefit. Leaders who empower and engage their teams are seen as initiating a cycle of positive exchanges, where project teams reciprocate with heightened motivation, improved performance, and ultimately, greater project success (Shaukat & Alam, 2023). By incorporating SET, this research underlines the importance of social and emotional exchanges between leaders and their teams, illustrating how these exchanges influence team empowerment and performance, thereby improving project success. This theoretical lens offers a clearer understanding of the pathways through which leadership affects project success and lays the groundwork for upcoming research exploring leadership as a social exchange process within the context of project management.

The results suggested that transformational leadership empowered project teams by giving authority to the teams and encourages them for autonomy so they could improve the project outcome in a positive manner. TL raises team performance through the alignment of personnel efforts with the objectives of their team, ensuring that all team members are motivated and equipped to outperform. The results of the present study mirror the reciprocity (Blau, 1964), principle of Social Exchange Theory, which suggests that leaders who invest in the development and well-being of their teams members will, in turn, receive greater engagement and performance from their followers. Accordingly, the current study not only advances SET theory by delineating how TL can enhance key team dynamics but also presents strong evidence on the mechanisms through which TL enhances project success. This extension of leadership philosophy into project management develops both fields, bringing novel insights for practitioners interested in leadership practices and in project outcomes.

5.2 Managerial implications

Beyond the theoretical contributions, the present research offers practical implications for project leaders and practitioners aiming to augment project success. The results advocate that adopting a both transformational and knowledge oriented leadership can profoundly increase project success (Siddiqui & Shaukat, 2023; Siddiqui & Shaukat, 2024). The research emphasizes the critical function of TL in driving project success. Managers are encouraged to embrace TL practices, including inspiring a shared vision, fostering collaboration, and motivating teams to realize project goals. By doing so, mangers can empower their teams effectively and increase team performance,

both of which further mediate the positive relationship between TL and project success. This advocates that firms should invest in leadership development programs centering on transformational skills, including mentoring, training and communication strategies.

Second, the findings also highlight the importance of knowledge oriented leadership in project contexts, confirming its direct effect on project success. Managers should focus on nurturing knowledge oriented behaviors, such as promoting a culture of knowledge sharing, expending continuous learning, and encouraging creative problem solving approaches. However, the mediating functions of team empowerment and team performance were found to be insignificant in this perspective. This implies that while KOL augments project success directly, its ability to stimulus team dynamics as mediators requires further exploration. Managers should therefore consider adding additional mechanisms in the complex research model.

Third, the differential mediating effects observed in this research indicated that a one-size-fits-all approach to leadership may not be appropriate across all projects. Managers should tailor their leadership strategies based on the distinct characteristics of their teams and projects. Particularly, for projects where TL is dominant factor, leveraging team empowerment and team performance as mediators can maximize success. Conversely, for KOL-driven projects, concentrating on direct mechanisms such as structured knowledge-sharing systems may yield better results. By aligning leadership styles with project requirements, organizations can accomplish superior project effectiveness and sustainable success.

Fourth, The findings of this research highlight a critical issue in Pakistani software companies leaders are not effectively practicing knowledge-oriented leadership (KOL), despite its significant positive impact on project success (PS). While the direct effect of KOL on PS is evident, the absence of substantial mediating effects through team empowerment and team performance suggests that KOL practices are either underdeveloped or inadequately implemented. This gap underscores the need for leaders in the software sector to adopt and promote KOL practices, focusing on fostering a culture of knowledge sharing, learning, and innovation. Addressing this issue is essential to unlocking the full potential of team dynamics and enhancing project outcomes in an increasingly knowledge-driven industry. Organizations must prioritize leadership training, create mechanisms for effective knowledge dissemination, and align leadership strategies with the principles of KOL to drive sustained success.

5.3 Research limitations

While the present research offers practical insights, however, the study has a few limitations that should be considered. First, the research focuses on information technology projects, which may limit the generalizability of the findings to other industries. The unique characteristics of the information technology sector may not fully represent other industries where various leadership practices and team dynamics might play a more important role. Therefore, it is suggested that upcoming research expand the scope by exploring different sectors, enabling a broader understanding of the relationship between leadership styles, team empowerment, team performance and project success. In addition, to increase the finding's external validity, it would be beneficial to conduct similar research in different countries and cultural contexts, allowing for a more global perspective on these proposed relationships.

Second limitation of this research is its cross-sectional design. Although it is offering valuable insights, however it limits the ability to draw conclusions about cause-and-effect relationships over specific time period (Spector, 2019). To address this, upcoming research could adopt an explanatory or longitudinal approach, which would allow for a profounder understanding of how leadership styles, team empowerment, team performance and project success evolve over time. Another recommendation for upcoming research is to explore other potentially influential leadership approaches, such as entrepreneurial and sustainable leadership. This would also help in recognizing which leadership approach is most effective in different project contexts.

Finally, we considered notable team dynamics as mediators in our research model, however, future research could explore additional mediating mechanisms. In this regard, frugal innovation which focuses on developing cost-effectiveness and also offers efficient solutions with limited resources, could play a significant role in how leadership styles influences project success. In particular, leadership approaches like transformational and knowledge oriented leadership may foster an atmosphere that encourages frugal innovation, ultimately contributing to improved project outcomes. Upcoming research could incorporate frugal innovation as a mediator, particularly in contexts where resource constraints and cost-effectiveness are critical factors for project success.

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