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RESEARCH PAPER

Impact of Ambidextrous Leadership Style on Project Success: understanding the role of Innovative Work Behaviour and Workforce Agility in the Software Industry

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ABSTRACT

The purpose of our research is to examine the impact of ambidextrous leadership on project success through the mediating role of innovative work behaviour and workforce agility. During the last three decade, the significance of technology oriented projects has increased, particularly in the COVID-19 pandemic. Therefore, research on the antecedents of software projects has emerged as an interesting area for scholars. Data were collected from 324 software industry professionals in Pakistan using a purposive sampling technique to accomplish this purpose. The obtained data were analysed through SPSS. The findings show that ambidextrous leadership is positively associated with project success, while innovative work behaviour and workforce agility fully mediate this association. This research examined a new model to examine the effect of ambidextrous leadership on project success. Our research adds to the prevailing project management literature by empirically examining the intervening constructs (innovative work behaviour and workforce agility) between ambidextrous leadership and project success in the software industry. This research also provided an important recommendation at the end of the study.

KEYWORDS Ambidextrous Leadership, Innovative Work Behaviour, Workforce Agility, Project Success

Introduction

In the project management (PM) literature, project success emerges as one of the most interesting concepts, catching the consideration of various scholars in the PM area (Mubarak et al., 2024; Khan et al., 2024). In the current uncertain, competitive, and complex environment, project success is important for ensuring long-term organization sustainability, customer satisfaction, and competitive advantage, particularly in the software industry (Khattak et al., 2022). In the last three decades, the significance of software projects has surged, particularly during and after the COVID-19 pandemic. However, the failure of software projects is very high, as the Standish Group Report (2021) indicated that the majority of projects encounter time and overrun (almost 84%), where 31% get abandoned (Khan et al., 2024). Similarly, in Pakistan, the failure of software projects is very common (Khan et al., 2022), making it valid to examine the elements that can ensure software project success.

A plethora of studies has identified critical technical and behavioural factors for project success (Sudhakar, 2012). Among the behavioral factors, leadership styles have been established to be the most dominant factor for project success, including transactional, transformational, servant, empowering, and authentic leadership (Khan et al., 2020; Khattak et al., 2024; Ellahi et al., 2022). The innovative attributes of

ambidextrous leadership make it a highly appealing choice for accomplishing project success (Rosing et al., 2011; Zheng et al., 2017), however, the linkages between ambidextrous leadership and software project success have still not been empirically explored. Rosing et al. (2011) defined AL as "the ability to foster both exploration and exploitation by opening and closing leadership behaviours and by dynamically switching between them as the situation require". Researchers have noted that AL significantly impact innovative and team performance (Gerlach et al., 2020; (Zacher and Rosing, 2015)), which ultimately pays to overall project success. This encourages the this research to investigate the relationship between AL and project success. To study the nexus between AL and project success (PS), it is critical to know how AL encourages its subordinates toward effectively completing project objectives. Therefore, our research proposes innovative work behaviour (IWB) and workforce agility (WA) as the two mediators in this relationship. According to Patil & Suresh (2019) WA is the ability of workforces to constantly adapt the work change or effectively respond. Where Muduli and & Pandya (2019) argued that agile behaviour of the individual refers to a mixture of resilient, proactive, generative and adaptive behaviour. AL inspires WA by balancing both exploitation and exploration, supporting the followers to adapt to quick changing situations successfully. AL improves a flexible working atmosphere where the innovation and efficiency coexist, improving awareness to uncertain market needs. In the technology-oriented condition, AL enables the individual to experiment with emerging technologies while supporting structured development practices, certifying both innovation and stability. Hence, we assume that WA has an intervening role between AL and project success. Another potential mediating construct is innovative work behaviour. Innovations emerge when a workforce is driven, encouraged, and implements emerging ideas as a vital element of innovative work behaviour (Jong and Hartog, 2010). Open behaviours of AL include motivating the workforce to think differently, tolerating employees ' errors and experiments, encouraging the workforce to take risks, and challenging the status quo (Usman et al., 2022). Innovative work behaviour can lead the workforce to speedily resolve job-related issues (Zhou and Wu, 2018), which is a critical factor in the success of the organization (Scott and Bruce, 1994). This indicates that Workforce innovative work behaviour may mediate the link between AL and project success. Therefore, we assume that innovative work behaviour is a mediator between AL and project success in the software industry. The theoretical research model of the current study is presented in Figure 1

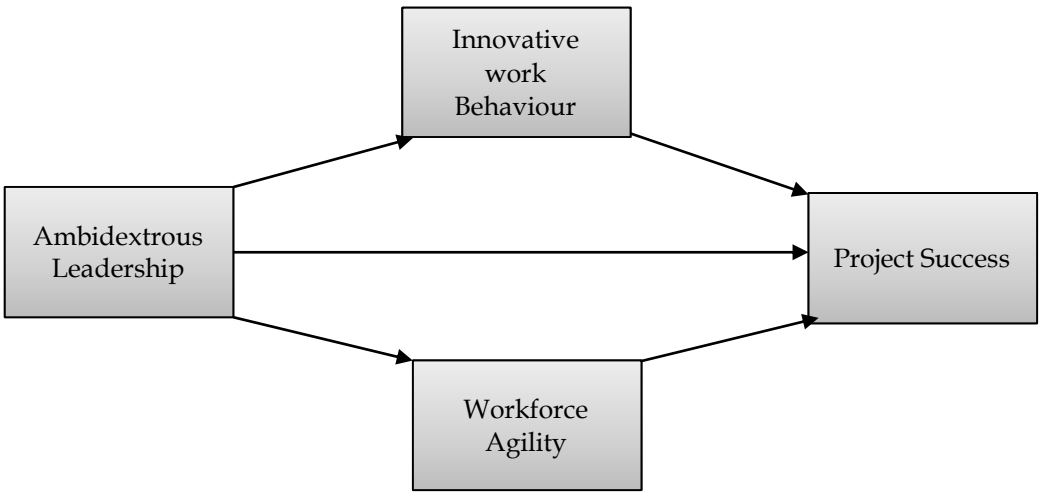

Figure 1 Research Model

Literature Review

Ambidextrous leadership and software project success

The prevailing body of knowledge on ambidexterity classifies AL into two types: closing (exploitation) and opening (exploration). The closing leadership style minimizes variability in subordinates and is theorized as a predictor of subordinates' exploration behaviours (i.e., engaging in routines or standardized activities or concentrating on executing well-defined activities (Rosing et al., 2011; Alghamdi, 2018). Closing leadership attributes lead to subordinates' exploitation activities like setting specific procedures, taking corrective actions, monitoring goal accomplishment, establishing routines, and sticking to plans, employing present skills, process, and knowledge through implementation and efficiency to deliver existing outcomes (Rosing et al., 2011; Zacher and Rosing, 2015). Opening leadership refers to the behaviour that is intended to improve variability in subordinates and is described by their results (i.e., subordinates' exploration activities, e.g., activities like deviating from routing job (Alghamdi, 2018; Zacher and Wilden, 2014; Zacher et al., 2016; Rosing et al., 2011). Opening leadership activities lead to subordinates' exploration behaviours such as generating novel knowledge, motivating different approaches for goal achievements, giving room for novel ideas, allowing skills, process and errors through experimentation, risk, search, variety, innovation and discovery to maintain future viability (Kafetzopoulos, 2022). AL is the collaboration between these two balancing leadership behaviours, closing and opening (Kafetzopoulos, 2022).

Due to the software project characteristics, including high risk and uncertainty, task complexity, and limited duration, effective leadership is crucial for the project's success (Khattak et al., 2022; Zheng et al., 2017). Effective leadership is also encouraging workforce to commit and accomplish the desired project goals (Aga et al., 2016; Tyssen et al., 2014). AL, which balances both exploration and exploration behaviours, progresses software PS by developing both efficiency and innovation. This dual behaviour allows the individual to adjust to the complex needs of the project while maintaing operational stability, leading to improved project endings. Study result indicated that AL is positively related with innovation performance (Gerlach et al., 2020). Thereby, current research work proposes the below research hypothesis.

H1 AL positively influences software PS.

Mediating role of innovative work behaviour

The concept of innovation has long highlighted that innovation covers beyond mere employee's creativity; it also includes the execution of new ideas (King & Anderson, 2002). Therefore, innovation is not restricted to new idea generation however also includes the attitude necessary for implementing ideas and bring improvements that improve both business and workforce performance (Jong & Hartog, 2010). The IWB is particularly important in the context of technology-oriented projects (Khan et al., 2024). This is defined as individuals' proactive involvement in the initiation and implementation of fresh ideas connected to job activities, eventually enabling the organizational performance (Afsar & Umrani, 2020). Previous study has recognized leadership role as a critical elements prompting followers' IWB (Lee et al., 2020). AL nurtures software PS by stimulating individual innovative performance through its dual dimensions comparing opening and closing (Usman et al., 2020). The IT PS is deeply reliant on individual creativity and innovation (Khan et al., 2024), as an innovative

individual effectively attains project goals (Ali et al., 2020). Innovation catalyses firms to increase expansion and resilience uncertain atmospheres (Mubarak et al., 2021). IT PS mainly depends on R&D, as well as the detection of distinctive innovation and ideas (Mubarak et al., 2021). Workforce IWB acts as a critical bridge, interpreting the flexibility and adaptability nurtured by AL into followers creativity and efficiency, problem-solving in software realted projects. Workforces demonstrating a higher degree of IWB are more likely to rationalize processes, reduce technical challenges, and improve PS. By encouraging proactive idea creation and risk-taking, workforce IWB increases the positive influence of AL on software PS. Therefore, IWB play as a pivotal role through which AL drives the PS by fostering creativity, adaptability, and performance enhancement.

H2: IWB is positively mediating the relationship between AL and PS.

Mediating role of workforce agility

WA is described as a worker's capability to respond to contingency-driven condition and opportunity appropriately and promptly, which has been 03 key dimensions including the individual proactivity, adaptability, and resilience (Petermann & Zacher, 2020). Speciality, adaptability is related to changing oneself or one's attitude to adjust within a new situation (Sherehiy & Karwowski, 2014; Khan et al., 2024). In understanding how company stakeholders can positively respond to unpredicted change, the WA concept is a critical view of developing company flexibility during the current time. Where resilience defines being able to manage work-related tasks successfully under stress, pressure, and change regardless of the undefined atmosphere and the more relevant approaches adopted. The individual proactive behavior entails being engaged in actions that assist others and oneself within fresh salutations (Vapiwala et al., 2025).

Software projects can be characterized as high feature and high-tech, a high dynamic product and service development life cycle (Patil and Suresh, 2019). Being a leader in such salutations, the organization must focus priorities on accomplishing shorter product and service development cycles with workforce agility. This research proposes that workforce agility plays an important intervening role in the linkages between AL and project success by facilitating organizations to adapt smoothly to speedy changing market requirements and technological advancements. AL, who balances exploitation and exploration, enhances an atmosphere that improves individual problem-solving abilities, responsiveness, and flexibility. This agility allows the workforce to successfully optimize resource application, drive innovation, and navigate uncertainties, ultimately enhancing project results. So, workforce agility works as a key construct through which AL translates into greater project success in the uncertain project success.

Hypothesis 3: Workforce agility is positively mediating the relationship between AL and project success

Research Methodology

The software industry in Pakistan has emerged as a key sector contributing significantly to the country's GDP. Recognizing its growing impact, this study focuses on the Pakistani software industry and collects data from 324 software professionals through a purposive sampling technique. The nature of our research work was

quantitative. The respondents including project directors, team leaders, managers, and supervisors were selected from target population, who were actively engaged in projects and possessed a minimum of five years of professional experience. A total of 420 survey questionnaires were distributed among the targeted respondents, yielding 324 (sample size) completed responses. The collected data was analyzed using SPSS (Version 24). The demographic characteristics of the respondents are presented in Table 1, while Table 2 details the measurement scales adopted from previous studies to assess the study variables.

Table 1
Demographic detail

Demographic information	Frequency	Percentage
Gender		
Male	212	65
Female	112	35
Age		
20-30	125	39
31-40	97	30
41-50	59	18
above 50	43	13
Qualification		
14 years	96	30
16 years	154	48
18 yearss	74	23
Experience		
less than 5	117	36
Less than 10 years	85	26
less than 15 year	69	21
less than 20 year	53	16

Table 2
Measurement scales

Variables	Reference	Total items
Ambidextrous leadership	Zacher and Rosing (2015)	09
Innovative work behaviour	Janssen (2000)	09
Workforce agility	Muduli (2016)	07
Project success	Aga et al.(2016)	14

Results and Discussion

The collected data was analysed using SPSS software, and the mediation analysis was conducted through the PROCESS macro (Hayes, 2012). To further validate the mediating effects of IWB and workforce agility, the Sobel test was employed (Preacher & Hayes, 2004). Given that the data for AL, IWB, workforce agility, and project success were collected simultaneously, the potential issue of common method bias (CMB) was addressed. To mitigate this concern, Harman's single-factor test, as suggested by Podsakoff et al. (2003), was applied. Factor analysis confirmed a five-factor model, with no single factor accounting for more than 50% of the total variance, indicating that CMB was not a significant issue. The internal consistency of all research constructs exceeded the recommended threshold, demonstrating satisfactory reliability (see Table 3). Furthermore, correlation analysis revealed that AL was positively associated with project success ($r = 0.454$, $p < 0.01$). Similarly, IWB ($r = 0.386$, $p < 0.01$) and workforce agility ($r = 0.408$, $p < 0.01$) also exhibited significant positive correlations with project success, the

study's dependent variable. To assess the mediation effects, the PROCESS macro in SPSS (Hayes, 2012) was utilized. In the regression analysis, AL was treated as the independent variable, IWB and workforce agility as mediators, and project success as the outcome variable, as presented in Table 4

Table 3, Correlations for our study variables

Variable	Cronbach's a	AL	IWB	Workforce agility	Project success
AL	0.743	1			
IWB	0.827	0.318	1		
Workforce agility	0.786	0.454	0.378	1	
Project success	0.807	0.454	0.386	0.408	1

In the initial stage of the mediation model, the regression results indicated that AL had a significant impact on project success, independent of the mediating variables, F(1,712) =28.03, p<0.001, R2 = 0.25, b=0.15,t (134) =5.234, p<0.001. In the second stage, the regression results showed that AL had a significant effect on the mediating variable, IWB, F (2,165) = 38.3, p<0.001, R2= 0.17, b=0.09, t (159) = 4.254, p<0.001. In the third stage, the regression results demonstrated that AL also had a significant effect on workforce agility, F (1,915) =34.7,p<0.001, R2=0.20, b=0.08, t(126)=5.003,p<0.001. In the fourth step, after controlling for AL, the mediating effect of IWB remained significant, F (1,856)=37.40, R2=0.28,p<0.001,b=0.78, t (144) =6.04, p<0.001. In the fifth step, the mediating effect of workforce agility, after controlling for AL, was also significant, F (1,904)=34.40, R2=0.25,p<0.001, b=0.64, t(128)=5.14,p<0.001. In the sixth stage, the results indicated that, even after controlling for IWB, AL remained a significant predictor of project success, b=0.14, t (140)=4.86,p<0.001b = 0.14, t(140) = 4.86, p < 0.001b=0.14,t(140)=4.86,p<0.001. Finally, in the last stage, after controlling for workforce agility, AL continued to be a significant predictor of project success, b=0.17, t (132)=5.04, p<0.001b = 0.17, t(132) = 5.04, p < 0.001b=0.17, t(132)=5.04,p<0.001.

Table 4
the mediation results

Model	Coefficient	SE	t	p	CI (lower)	CI (upper)
Without mediator						
AL → PS	0.1476	0.0296	4.986	0.000	0.1343	0.1643
With mediator						
AL → IWB	0.1267	0.0321	3.947	0.000	0.1812	0.2176
AL → WA	0.4032	0.0596	6.765	0.006	0.1404	0.1714
With mediator						
IWB → PS	0.2853	0.0538	5.302	0.000	0.1739	0.2012
WA → PS	0.2034	0.0285	7.136842	0.004	0.115	0.1423

Conclusion

The empirical model of our research investigated the impact of AL on project success through the IWB and workforce agility as mediators. As predicated, software industry professionals showed that leaders ambidextrous attributes offer positive results in the PM context. Software industry professionals appreciated the AL approaches to encourage the workforce to towards the successful execution of projects within the organization (Usman et al., 2022), findings AL as an important antecedents of project success. The finding suggested that AL enhances a situation that promotes adaptability and innovation, both of which are critical for the success project. IWB improves problem-solving and creativity, while workforce agility facilitates firms to react successfully to the dynamic environments. The mediation result further confirms that these elements play an important role in transforming leadership effectiveness into software project success. Firms intending to enhance the performance of their projects should focus on building leadership policies that balance exploitation and exploration. By building both workforce adaptability and innovative behaviour, organization can improve their project success.

These inputs add to the evolving body of knowledge on leadership and project context by highlighting the importance of AL in a dynamic work setting.

Theoretical implications

The current study adds to the emerging body of knowledge on AL by founding its positive effect on project success through the intervening roles of IWB and workforce agility in the software industry. By integrating leadership, agility, and innovation in a PM context, the current study enhances the theoretical understanding of why leadership promotes dynamic capabilities within firms. The outcomes reinforce the significance of AL as an antecedent of both explorative and exploitative attitudes, allowing organizations to manage complex situations. Further, current research extends the present literature by highlighting the interplay among leadership, creativity, and adaptability in accomplishing project success. The mediation results offer empirical confirmation of how IWB and agility of workforce translate leadership usefulness into solid project results. In addition to this, current work indicates the significance of balancing stability and flexibility to maintain project performance in the software industry. The inputs deliver a deeper theoretical viewpoint on positive leadership's role in improving organization innovation-driven success.

Practical Contribution

From a practical viewpoint, current research delivers important inputs for project leaders and industry managers on leveraging AI to improve project results. Firms should concentrate on building leadership approaches that simultaneously develop adaptability and stability, ensuring an employee's capability of reacting successfully to complexity. By building IWB, leaders can motivate subordinates to build creative explanations that ensure project success. Improving agility at the workplace further equips the workforce with the capability to adapt to shifting project requirements, enhancing responsiveness and efficiency. Current study results indicate that a training program for leadership should focus on AL attributes to cultivate an atmosphere of flexibility and innovation. Further, the organization should execute policies that facilitate a dual focus on long-term and short-term project efficiency. By combining these leadership styles, firms can significantly improve their PM effectiveness and business success.

Recommendations

According to other research works, the current research also has various limitations, which create opportunities for further examination. First, we targeted only the software industry, which may limit the generalizability of our study; hence, future studies may include multiple sectors to address this issue. Second, the current study does not consider any moderating variables; future research may also explore this aspect. Third, for data collection, the current study uses a cross-sectional research technique, whereas future research may adopt a longitudinal approach to better understand the proposed relationships. Fourth, we have considered only the impact of AL, future studies may include another new leadership style.

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