

Understanding How Entrepreneurial Leadership Shapes Employees' Innovation Through Employees Intellectual Agility: A Mediation Analysis

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Abstract:

Entrepreneurial leadership is a significant predictor of employee's innovative behavior with the mediation of employee's intellectual agility among information technology sector of Pakistan. This study aims to determine the association between innovative behavior performed by employees and entrepreneurial leadership, while also investigating the mediating functions of employee's intellectual agility in this relationship. Data were gathered from 295 workers of Pakistani information technology (IT) service companies using a cross-sectional study approach. To test the suggested research model, the partial least squares–structural equation modelling¹(PLS–SEM) technique was used. The results show a strong positive correlation among employees' innovation and entrepreneurial leadership. Furthermore, this link is simultaneously mediated by employee's intellectual agility. This study reveals how crucial entrepreneurial leadership is in encouraging innovative behavior among staff members in the IT services sector. The results of this study indicate that managers can improve the abilities of their staff members' intellectual agility by modelling entrepreneurial behaviors. This will encourage staff members to exhibit innovative behavior, which will improve organizational innovation performance. By combining different philosophical perspectives, this study adds something new to the theory of entrepreneurial leadership by presenting a picture of the mechanism which transfer influence of entrepreneurial leadership on innovative work behavior.

Keywords ; Entrepreneurial leadership; Employees Intellectual agility; Innovative work behavior; Pakistan IT Sector.

1.Introduction:

The aim of success in an uncertain and competitive market requires an organization to adopt entrepreneurial behaviors that foster creativity, flexibility, and innovation (Wu et al., 2020). Effective leadership is one of the main factors behind successful change, today companies that wish to prosper in the constantly shifting business world cannot rely on obsolete management strategies (AlKayid et al., 2023). Many researches shows that there is a significant impact of

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leaders on employees outcomes (Jakobsen et al., 2023; Zia et al., 2022). Moreover, given that the corporate context has become more adversarial and unstable, another kind of leadership style is necessary, that is recognized as entrepreneurial leadership, which in comparison to traditional managerial leadership, focuses on those aspects and business features of a leader that might cause entrepreneurial intent: opportunity identification and exploitation (Lee & Ding, 2020). Empowering leadership gaining value in the past few years as organizations aim for greater efficiency, sustainability and flexibility (Subramaniam & Shankar, 2020). Since in the start of nineties, there is a significant increase in the accumulation of knowledge in EL. In order to gain more comprehensive knowledge of how leaders effect their employees innovative work behavior (EIB), Scholars should investigate mediating variables simultaneously, according to recent studies by Hoang et al. (2022) higher degree of theoretical accuracy is necessary to comprehend the mechanisms and procedures by which EIB can be impacted by entrepreneurial leaders (Bagheri, Akbari, & Artang, 2022).

Furthermore, there is emerging evidence aimed the theory that employee innovative behavior encourages constant innovation (Zhang & Yang, 2020). therefore, over the past few years employee innovative behavior research has gained popularity (Khan et al., 2012). However, mostly the focus of recent research is on transformational leadership (Karimi et al., 2022). Moreover, the focus of recent research is on other leadership styles such as Servant (Khan et al., 2022), Inclusive (Javed et al., 2021) and authentic leadership (Purwanto et al., 2021). Throughout this study, we propose that leaders should help subordinates in perceive, grab opportunities for entrepreneurship, to use innovation to obtain a competitive edge and accomplish organizational success in a challenging and dynamic work environment.

Furthermore, to the best of our understanding, there is a need to research that how the entrepreneurial leadership (EL) and employees agility (EIA) relates each other in terms of recognizing opportunities for business (Bagheri & Harrison, 2020). Moreover, researchers highlighted in there research that employee innovative work behavior is improved by employee's intellectual agility (EIA) which promotes openness to new ideas and heightens employees' motivation to explore them, improves employees' innovative behavior (Li et al., 2020). Previous study has shown a EL relationship with EIB, additional research is needed to fully comprehend the mechanisms through which entrepreneurial leadership (EL) impacts employee innovative work behavior (EIB). (Bagheri, Akbari, & Artang, 2022).

Based on this, the objective of this study is the development of conceptual model that elucidates how entrepreneurial leadership fosters innovative behavior and to examine the mediating role of intellectual agility (EIA) in this relationship by examining a sample of workers in Pakistan's IT sector. Our research fills up a number of gaps in the body of knowledge. The primary objective of this study is to fill a gap in the empirical data about the significance of EL in promoting employee innovation by carefully examining employees intellectual agility mediating role (Hoang et al., 2022). Second, this research will help explore entrepreneurial leadership in Pakistan's IT sector (Hoang et al., 2022).

2. Hypotheses Development and Theoretical Background

2.1. Social Cognitive Theory (SCT)

To bridge this gap in research, we particularly study the mediating role of EIA in our research model, which we create via the support of social cognitive theory (SCT) (Bandura, 1991). This approach aims to fulfil the expectations of researchers to explain how employees intellectual agility is effected by entrepreneurial leaders. The theory of social cognitive offers a structure for learning, forecasting, and modifying behavior among people. According to the social cognitive theory (SCT), a person's behavior is influenced by their views, performances, and

beliefs. Additionally, the formation and alteration of human ideas and cognitive capacities by environmental structures and societal influences is a common aspect of the relationship between an individual and their environment.

The last interaction between behavior and environment consists of how an individual's actions shape the features of their surroundings, which then shapes the behaviour of the individual (Bandura, 2005). This allows us to study employees' intellectual agility as affective and motivational factors, which have been identified as critical links between leadership and creative behaviour at work (Hughes et al., 2018). Numerous research has already empirically examined a variety of outcomes, such as innovative behaviour, to determine the impact of EL on employees' outcomes through the application of the STC (Bagheri, Akbari and Artang, 2022; Bagheri et al., 2020; Cai et al., 2019). Consequently, this study has expanded on earlier research by suggesting that the EIA functions as a mediator in the relationship between the EL and workplace innovation, with the EL serving as an external determinant.

2.2. Entrepreneurial Leadership and Employees innovative behavior

Previous empirical investigations have revealed a significant relationship between innovation and entrepreneurial leadership (Akbari et al., 2021; Al-Sharif et al., 2023; Bagheri & Akbari, 2018; Newman et al., 2018). Identifying among other leadership styles, entrepreneurial leaders concentrate on driving innovation and recognition of opportunity procedures to achieve company goals, particularly in unpredictable tough environments (Al-Sharif et al., 2023) formed in the relationships between leadership and entrepreneurship (Hou et al., 2024). The impact of entrepreneurial leadership on organizations' creativity has been proved, since it enables the development and promotion of a compelling entrepreneurial vision. for the company, setting an example for behavior innovativeness and leading staff members completing with the process of developing and implementing novel concepts (Bagheri, Akbari, & Artang, 2022). In order to maximize creativity and provide the resources and assistance required for opportunity detection, entrepreneurial leaders develop strategic frameworks that stimulate innovation inside their organizations (Renko et al., 2015).

Evidence from earlier research emphasizes how important entrepreneurial leadership is for fostering innovation in a variety of organizational contexts. For instance, Huang et al. (2014) discovered that 168 Senior managers in businesses had significant effects from entrepreneurial leadership in terms of both exploitative and explorative innovation traits. Bagheri and Akbari (2018) results also showed that middle and senior managers' capacities for the whole innovation process from the creation, development, and selection of original ideas to their communication and dissemination across many industries are significantly improved by entrepreneurial leadership. Employees in social companies and healthcare organizations exhibit much more innovative behavior when led by an entrepreneurial spirit, in addition to commercial firms (Newman et al., 2018) On the basis of above literature, the hypothesis that is tested is given below.

H1: There is a positive correlation between entrepreneurial leadership and employees' innovative work behavior.

2.3. Entrepreneurial Leadership and Employee Intellectual Agility:

Scholarly research on EL has examined the characteristics and abilities of entrepreneurial leaders over time (Pauceanu et al., 2021; Renko et al., 2015) such as demographic (Renko et al., 2015), psychological (Rauch & Frese, 2007) and professional (He et al., 2017) characteristics. While the last one is related to entrepreneurial leader's efforts to help network of followers in the development of strategic value, the earlier refers to an entrepreneurial leader's capacity to articulate the vision and guide their team in an unpredictable environment

(Leitch et al., 2013). According to (Fontana & Musa, 2017) emphasizes that information acquisition, integration, and exploitation are necessary for an entrepreneurial mindset. Because individuals of an organization must be "quick on their intellectual feet" (Bontis et al., 1999), intellectual agility is intimately associated with character attributes and competencies that the EL literature recognizes as important, such as creative thinking, flexibility, and adaptability. Because of this, it's regarded as an accurate indicator of potential leadership. Following is the hypothesis on the basis of above literature.

H2: There is a positive correlation between entrepreneurial leadership and employee's intellectual agility.

2.4. Employees Intellectual Agility and Innovative Work Behavior

In an increasingly society of knowledge , participation in research, development, and production of new products, areas of business, manufacturing techniques, knowledge transfer, and organizational structures is essential for both success and survival (De Bem Machado et al., 2022). These skills, sometimes referred to as innovativeness, are seen to be essential resources that link companies' internal innovation capabilities with the results of the innovation process (Mariz-Pérez et al., 2012). Innovative behavior is a non-tangible resource that is part of organizational human capital knowledge. Businesses are able to transfer information into new product lines, services, or procedures that the market requires when employees' intellectual capacities are developed (Bansal et al., 2023). Obeng (2019) investigated the relationships in developing economies between social capital, performance, and innovation.

The findings of the study suggest that social capital positively impacts performance, and that a higher level of social capital will probably translate into higher corporate performance. Moreover, the importance of creating an environment that encourages employee innovativeness and effort was mentioned in the early literature on organizational management. For instance, Pokharel and Choi (2015) found that employee initiatives in the areas of knowledge and skill enhancement, fostering self-confidence and skill development, developing interest and motivation for tackling challenges, and moving potential barriers forward are significantly motivated by employees' perceptions of the value of their suggestions to management and the organization. Furthermore, an abundance of empirical research has indicated that the ability to transform and utilize knowledge increases innovative potential and fosters organizational achievement (Mariz-Pérez et al., 2012). therefore there is a favorable effect of innovation agility on innovation in organizations.

From the perspective of SCT, we propose that EIA and capacities usually contribute to the success of innovation, even while managers are responsible for creating an atmosphere that is supportive of it (Dabić et al., 2021). The essence of intellectual agility is understanding the difficulties that businesses face, using this understanding to a company's operations, and modifying the business's competencies according to changing market conditions. Choudhary et al. (2020), for instance, conduct an empirical investigation into the display of human capital investments at the individual level in order to determine the emergence and timing of micro-social orders resulting from organizational investments in their workforce. As a result, workers are appreciative of their companies for providing them with resources in the form of fresh knowledge, skills, abilities, and other attributes (KSAOs). Employees have been encouraged to share whatever information they have obtained with colleagues and peers, which promotes knowledge management practices. Employees' ability to innovate is enhanced when they engage in knowledge management behaviors relevant to the organization, which in turn encourages them to create, advocate for, and execute innovative ideas and methods. From above discussion we propose following hypothesis:

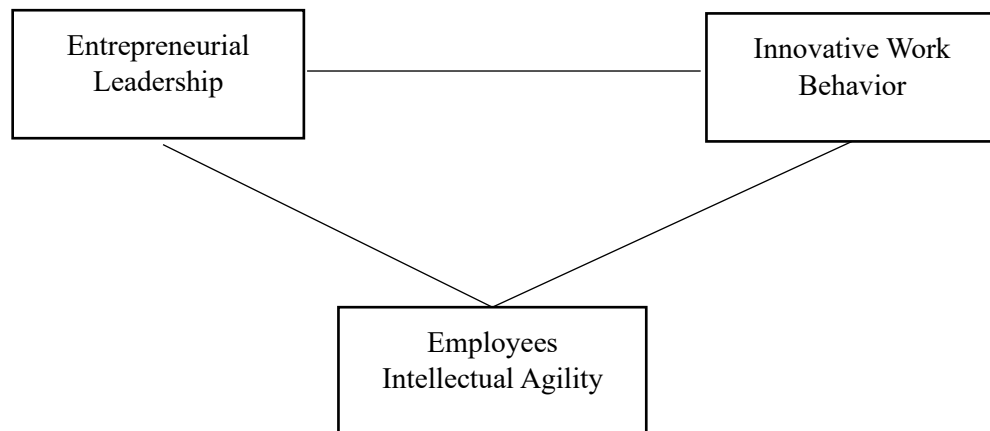
H3: There is a positive correlation between employees' intellectual agility and innovative work behavior.

2.5. Employees Intellectual Agility Mediation:

We offer a mediation model that links employees' innovative behavior and entrepreneurial leadership (EL), based on our previous discussions and hypotheses. To be more precise, we propose that EL improves employee intellectual agility (EIA), which in turn encourages innovative behavior on the part of employees. The social cognitive theory is consistent with this mediation mechanism (Bandura, 1988). Social Cognitive Theory offers a paradigm for comprehending how the interaction of environmental (such as leadership style and organizational culture) and personal (such as intellectual agility) elements shapes employees' innovative work behavior under entrepreneurial leadership. Entrepreneurial leaders may effectively encourage innovative behavior inside their organizations by cultivating a culture of innovation and providing people with the tools they need to enhance their cognitive talents. In conclusion, when workers see their managers as risk-takers and creative thinkers, it creates an environment that encourages employees to become more intellectually flexible. Increased creative work behavior among employees is a result of this enhanced intellectual agility, which is demonstrated by cognitive flexibility, openness to new ideas, critical thinking, and adaptability. From the above discussion we propose the following hypothesis:

H4: The relationship between entrepreneurial leadership and innovative work behavior will be significantly mediated by employees' intellectual agility.

Fig 1: Conceptual Model



To comprehend the interaction between variables, a conceptual model (see Figure 1) has been built based on theory and the proposed hypothesis.

3. Methodology

Online surveys were the primary means of gathering data. These questionnaires investigate the ways in which employee innovative behaviour (EIB) and the mediation effect of intellectual agility (EIA), a personal determinant, are fostered by entrepreneurial leadership (EL) utilizing a variety of previously established scales. Participants are workers in Pakistan's information technology industry. As mentioned by Lovett et al. (2018), we also made sure the survey was

efficiently constructed and formatted to prevent getting bad data while using the digital platform. In order to make sure that the employees had enough time to assess their present leader's leadership style, we required that the respondents be employed in Pakistan, between the ages of 20 and 50, and have at least six months of work experience with them.

Total 295 questionnaires were floated out of which 269 were returned. According to Hair et al. (2018) outline the listwise deletion procedure, a total of 256 valid questionnaires were used in the analysis. In the demographic analysis the percentage of male and female is 67% and 33%. Most of the participants are graduated 58% and participants with master's degree are 42%

Table 1: Demographic Profile

Demographic variables	F (N=256)	Percentage %
Gender		
Male	170	67
Female	86	33
Age		
20-30	96	38
31-40	101	39
41-50	59	23
Qualification		
Graduation	148	58
Master	108	42

3.1. Measures

3.1.1. Entrepreneurial Leadership Scale

The Renko et al. (2015) eight-item scale is used to assess entrepreneurial leadership. This measure was created by Renko et al. (2015) using previous conceptual and empirical research on entrepreneurial leadership. Despite restricting the scale to eight items, they were able to get high reliability and validity ($\alpha = 0.92$). Their scale, which was adapted from current research on entrepreneurial leadership, exhibits good validity and reliability (Bagheri, Newman, & Eva, 2022; Miao et al., 2019).

3.1.2. Employee Intellectual Agility Scale

An Alavi et al. (2014) designed 15-item scale ($\alpha = 0.84$) to assess the intellectual agility of employees. "I search for opportunities to make improvements at work" is an example of an item. A five-point Likert-type scale, with 1 denoting "never" and 5 denoting "always," was used to measure the intellectual agility of the workforce.

3.1.3. Innovative work Behavior Scale

We used a five-item scale developed by Scott and Bruce (1994) ($\alpha = 0.91$) to assess inventive behavior. An example would be something like this: "My staff member looks for innovative methods, procedures, and technology, and/or concepts for products."

4. Analysis Approach

The path modelling method was utilized to analyse the data obtained from the questionnaire survey using partial least squares structural equation modelling (PLS-SEM 4). PLS route modelling was chosen since it is widely accepted in management science disciplines (Hair et

al., 2012). The following study employed two-step methodologies, namely the Measurement model and the Structure model.

4.1. Measurement Model

As the initial step in the PLS-SEM analysis process, the measurement model needs to be evaluated to determine the construct validity and reliability. This led to an examination of the constructs' indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. The outcomes of the measurement model assessment are displayed in Tables 2 and 3. According to Table 2, the composite reliability values are higher than 0.70. Thus, it has been proven that the constructs are reliable (Hair et.al, 2012). In Table 3, Discriminant validity was evaluated using the method proposed by Fornell and Larcker (1981), which involves comparing the square root of each Average Variance Extracted (AVE), and average variance extracted (AVE) values should be greater than 0.50. The constructs' discriminant and convergent validity are confirmed by these Fornell and Larcker and AVE values. For structural analysis, the measurement model is suitable overall (Hair et al., 2017).

Table 2: Cronbach alpha, CR, AVE

Constructs	Cronbach's alpha	CR	AVE
Entrepreneurial leadership	0.886	0.888	0.557
Employees intellectual agility	0.906	0.906	0.516
Innovative work behavior	0.834	0.835	0.546

Table 3: Discriminant validity following Fornell and Larcker Criteria.

Constructs	EIA	EL	IWB
EIA	0.718		
EL	0.497	0.746	
IWB	0.536	0.435	0.739

Note: Off-diagonal values represent latent variable correlations, while values on the diagonal represent the square root of AVEs.

EIA = Employees intellectual agility, EL = Entrepreneurial Leadership, IWB = Innovative Work Behavior

4.2. Structural Model Evaluation

In order to determine whether collinearity might influence the path coefficients, we first looked at the structural model. Table 4 shows that all of the predictor constructs' variance inflation factor values are significantly less than the recommended value of 5 (Hair et al., 2017). Therefore, collinearity is not an issue in our structural model. Next, we looked at the cross-validated redundancy index and the coefficient of determination (R² value) for prediction accuracy. (Stone–Geisser's Q²) to determine the model's predictive significance. According to Hair et al. (2017), the suggested model adequately predicted innovative work behavior, accounting for 56% of the variance (R² 0.56). Comparably, the Q² results indicate that the employee's innovative work behavior and intellectual agility are 0.25 and 0.35, respectively.

These Q2 values, which are larger than zero, demonstrate the model's strong predictive significance (Hair et al., 2017).

Table 4 : Predictive Relevance

	R ²	Q ² predict
EIA	0.32	0.23
IWB	0.56	0.35

Note: EIA = Employees Intellectual Agility, IWB = Innovative Work Behavior

4.3. Hypothesis Testing

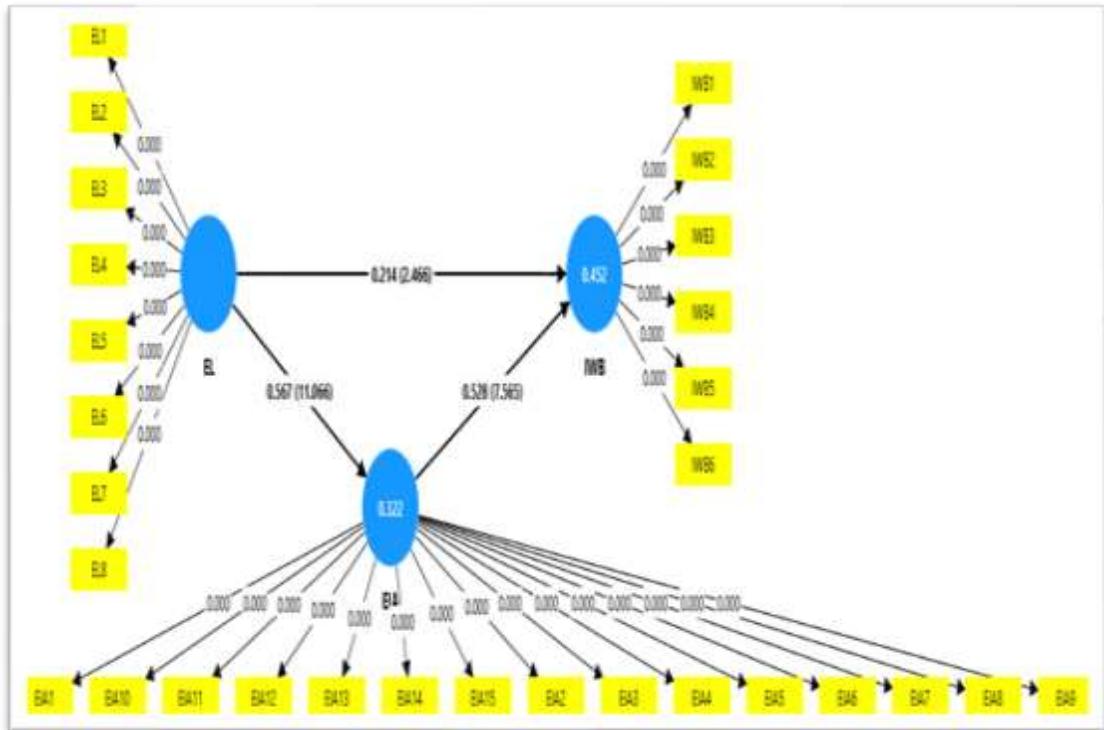
Path coefficients and their significance were evaluated. Using 5,000 bootstrap samples, the "no sign changes" option, and 95% bias-corrected confidence intervals, we used the bootstrapping technique to test our hypothesis. Figure 1 and Table 5 present the structural path analysis results. According to H1, innovative practices among employees are favorably correlated with entrepreneurial leadership. There is a strong and statistically significant positive correlation (t 7.56, P value 0) between innovative work behaviour and entrepreneurial leadership, as indicated by the overall effect presented in Table 5. H1 is therefore supported. H2 is supported since the results indicate a strong positive correlation between intellectual agility of employees and entrepreneurial leadership (t value 11.06, P value 0). Furthermore, H3's result indicates that innovative work behaviour among employees and entrepreneurial leadership are positively correlated (t value 7.206, P value 0).

Table 5: Finding SEM full model.

Hypothesis	SD	Path Coefficient	T statistics	P value	Decision
EIA -> IWB	0.07	0.528	7.565	0	Supported
EL -> EIA	0.051	0.567	11.066	0	Supported
EL -> IWB	0.071	0.214	7.206	0	Supported
EL -> EIA -> IWB	0.035	0.342	6.876	0	Supported

Note: EIA=Employees Intellectual Agility, IWB=Innovative Work Behavior, EL = Entrepreneurial Leadership.

The study's main goal was to investigate the role that employees' intellectual agility had in mediating the relationship between innovative work behavior and entrepreneurial leadership, as suggested by Hypotheses 4. To produce particular indirect effects for this mediation analysis, we adhered to the analytical process recommended by Preacher and Hayes (2008). Table 5 summarizes the results of the mediation test and shows that the indirect association (H4) that was proposed is supported. The findings demonstrate that the association between innovative behavior and entrepreneurial leadership is considerably mediated by employees' intellectual agility (t value 6.87, p value 0). Nonetheless, the complete simultaneous mediation of employees' intellectual agility is implied by the nonsignificant direct association between creative behavior and entrepreneurial leadership.

Fig 2: PLS Path analysis

5. Discussion and Conclusion

The literature has established the role that leadership plays encouraging innovative behaviour. In an effort to clarify this data, a recent line of study has started to look at how innovative employee behaviour is impacted by people-centric leadership styles like entrepreneurial leadership (Newman et al., 2018). Nonetheless, there is a dearth of knowledge regarding the mechanism by which entrepreneurial leadership can affect employee innovative behaviour (Sarwoko, 2020) due to the lack of research examining the relationship between these two phenomena, especially in high-tech service contexts like IT. Thus, the current study's objective was to investigate the connection between innovative behavior and entrepreneurial leadership and examine the mediating mechanisms using theoretical frameworks in order to further this line of inquiry. Based on 256 workers from Pakistani IT service companies, the findings show a robust and favourable relationship between innovative work practices and entrepreneurial leadership. Additionally, this interaction is simultaneously mediated by the intellectual agility of the employee.

According to the findings, employees are empowered and encouraged to challenge themselves as well as explore, generate, and implement new ideas when leaders carry out their roles and tasks in accordance with the principles of entrepreneurial leadership. These leaders not only come up with innovative solutions to problems and deal with challenges, but they also value and support new ideas created by employees and create strategies and approaches to facilitate innovation and opportunity recognition (Felix et al., 2019; Hansen & Pihl-Thingvad, 2019; Sethibe & Steyn, 2018). Additionally, it was stated in the research conducted by Akbari et al. (2021) and Iqbal et al. (2022) that EL is a crucial component that permits, fosters, and supports an employee's innovative behaviour. Lastly, prior research demonstrating the influence of human capital on innovativeness is consistent with the beneficial effect of employees' intellectual agility on organisations' innovativeness (Mariz-Pérez et al., 2012).

5.1. Limitations and Future Recommendations

The current research contains a number of limitations, similar to previous studies, which highlight areas that need to be explored further. To measure innovative behavior Self-report measures is used, which could cause CMB and increase the strength of associations, is the first and most significant weakness of this study. Although the methodology section discusses the theoretical and empirical justifications for the use of self-report measures of innovative behaviour, further research is necessary to replicate our findings using supervisor-rated or objective measures of innovative behaviour in employees. Second, the adoption of a cross-sectional research methodology puts into uncertainty our findings regarding the causal relationship of the correlations. We may justify the use of cross-sectional design because our study is confirmatory and based on reliable, well-established hypotheses. (Maya and Patterson, 2020; Iqbal et al., 2020). To determine the causality of correlations and validate our findings, it is advised that future researchers gather data in many waves and reexamine the suggested study paradigm.

Third, data from workers in one Pakistani high-tech services sector was gathered in order to examine the proposed research model. The research environment of a specific industry and culture may limit the applicability of our findings to other sectors and cultures. For more validated practical effects, more research involving a cross-industry and cross-cultural sample is necessary. Lastly, we omitted any boundary requirement to preserve the parsimony of our study model. According to situational strength theory, circumstances can either increase or decrease the impact of leadership on worker outcomes (Meyer et al., 2010). As a result, we encourage researchers to take into account boundary factors like encouragement of innovation (Scot and Bruce, 1994) and investigate the degree to which these variables act as a buffer between innovative employee behaviour and entrepreneurial leadership (Hughes, 2018; Malbari et al., 2022).

5.2. Conclusion

Our research has led us to the conclusion that innovative work behavior can be enabled by entrepreneurial leadership in the context of intellectual agility among employees. This study examined an integrated research model that uses employees' intellectual agility as a mediating factor to establish a connection between innovative work behavior and entrepreneurial leadership. This study demonstrates that the effective utilization of employees' intellectual agility can enable entrepreneurial leadership to have a notable impact on innovative work behavior, which is consistent with the literature on leadership and intellectual agility. The outcome shows that utilizing employees' intellectual agility will increase the success of entrepreneurial leadership.

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