

The Relationship Between Anti-fragility and Employee Engagement: The Mediating Influence of Perceived Insider Status in the Service Industry

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Abstract

In the context of intelligent technology, the study aims to examine the influence of employees' anti-fragility on perceived insider status and employee engagement, and explore the mediating role of perceived insider status. Employees in the hotel and tourism industry were investigated by random sampling, and 526 valid questionnaires were analyzed with exploratory and confirmatory factor analysis. Regression analysis was used to analyze the relationship between variables. The findings manifested that employees' anti-fragility made a positive effect on perceived insider status and work engagement. Apart from the direct effect on work engagement, perceived insider status also mediated in the relationship between anti-fragility and work engagement. The study may advance the understanding of anti-fragility by empirically examining its impact on perceived insider status and employee engagement, and promote organizational innovation and market adaptability.

Keywords: anti-fragility, perceived insider status, employee engagement, relationships and mediating effect

Paper type: Research Paper

1. Introduction

In a fiercely competitive market environment, talented employees are valuable resources for high-quality organizations, especially in the hotel and tourism industry. In order to keep excellent employees in organizations, it is crucial to inspire a sense of belonging and engagement with their work and organizations (Yu et al., 2022). It may further improve their performance and innovative capability to gain competitive advantages in modern society (Ohemeng et al., 2020). The more employees engage in their jobs and organizations, the greater their sense of job achievement and satisfaction will be (Zhao & Liu, 2023).

In the rapidly changing social environment, innovative areas and unpredictable risks keep increasing, and competition for talent in the hotel and tourism industry is intensifying as well. The key factor affecting employees' performance is not only limited to excellent skills, but also a full understanding of uncertainties, courage for challenges, and self-development by adapting to changes (Kong et al., 2023). Therefore, employees' anti-fragility is crucial to maintain service innovation capabilities and retain competitive advantages. Besides employees' task performance, hotel and tourism sectors also should pay attention to their relational performance, since employees' anti-fragility and perceived insider status may make a catalytic impact on their employee engagement (Shah et al., 2021).

Affecting by the rapid development of AI and related technologies, greater challenges may influence employees' performance, training, and psychology (Qiang, 2022; Narula, 2020; Wang et al., 2022). The frustration, fear, and vulnerability may also play influential roles in their relationship with work behavior. In addition, with the rapid development of information technologies, artificial intelligence has been applied in the hotel and tourism sectors to create value, provide efficient service, and improve consumers' experience (Munoz et al., 2022). However, employees may feel helpless and vulnerable under competitive pressure from technologies, which may lead to a decline in their service performance and even cause hidden, retaliatory work withdrawal in the tourism and hotel

industries (Tian et al., 2022). Employees' anti-fragility promotes positive relationships and feedback between employees and organizations (Zhao et al, 2022).

Great attention has been paid to the relationship between performance management and employees' anti-fragility. Some scholars pay attention to employees' psychology and behavior with the impact of intelligent technology (Cheng et al., 2022). The study discovered several multifaceted determinants of perceived insider status and employee engagement, including psychological contracts, decentralization, and supervisors' support (Wang & Cheng, 2010; Chen & Aryee, 2007). Anti-fragility plays an important role in a dynamic environment. It has been found that anti-fragility and perceived insider status may affect employees' citizenship behaviors, reduce work errors and turnover intention (Stamper & Masterson, 2002; Caron et al., 2019), and improve job performance and organizational commitment (Bu & Jezewski, 2007; Tian et al., 2022). When employees feel supported by the companies, their anti-fragility may result in a strong intrinsic incentive to engage in a job to achieve greater ambitions and accomplishments (Zhao & Lin, 2023). However, there may be a gap in clearly distinguishing anti-fragility and understanding how anti-fragility uniquely contributes to perceived insider status and engagement. Exploration of employees' anti-fragility and its impact in organizational settings, particularly concerning employee behavior and attitudes, is still limited, and the correlation remains to be tested.

Therefore, the study tries to investigate the effects of employees' anti-fragility on their perceived insider status and engagement, and explore the mediating role of perceived insider status. The study may advance the understanding of anti-fragility in organizational behavior by empirically examining its impact on perceived insider status and employee engagement, distinguishing it from related constructs. It also clarifies the mediating role of perceived insider status, providing insights into the mechanisms that enhance employee engagement. The findings may help organizations to develop strategies to better cope with the complex and dynamic work environment and create environments that support a more engaged and resilient workforce.

2. Literature Review

2.1 Anti-fragility and Employee Engagement

Anti-fragility (AF), proposed by Ramezani and Camarinhaa-Matos (2020), refers to the capacity for continuous self-correction, self-development, and self-regeneration, in the face of possible random events and unpredictable pressure (Wilder, 2014). The essence of anti-fragility is to not only endure but also derive benefits from volatility and stressors (Maechel et al., 2020; Dong et al., 2021). Safety is critical for fostering an environment where employees feel secure to engage in risk-taking and experiential learning, which are fundamental aspects of anti-fragility.

Employee engagement (EE) is defined as the level of employees' emotional and cognitive commitment to both their responsibilities and the success of their organizations (Vera & Sanchez-Cardona, 2021). The key drivers of engagement have been explored, including leadership style, job design, and organizational culture. Employee engagement remains a critical strategic priority for maintaining competitive advantage.

Employees' anti-fragility is conducive to promoting active participation, engagement, and innovation (Munoz et al., 2022). Employee anti-fragility may foster their adaptability and ongoing learning and enhance employee engagement by enabling individuals to resist, develop, and adapt through leveraging uncertainty and potential risks (Kong et al., 2023). Organizations integrating anti-fragility may promote adaptability, resilience, and a culture of continuous learning, which are crucial for enhancing employee development (Dong et al., 2021). Improvement through adversity acts as a catalyst for both personal and professional growth, with anti-fragile employees exhibiting greater resilience to stress and uncertainty (Munoz et al., 2022). The anti-fragility may inspire increased commitment and enthusiasm for work, thereby enhancing organizational performance (Sovacool et al., 2018). In times of stress and uncertainty, anti-fragile employees are more likely to take proactive measures, seek organizational support, and exert greater effort, thereby improving their engagement and ability to navigate career challenges (Im & Cho, 2021). Such employees tend to develop the skills and confidence necessary to adapt to the changing and unpredictable world (Dong et al., 2022). Therefore, in light of the discussion above, the following hypothesis is proposed:

H1: Anti-fragility may positively influence employee engagement.

2.2 Anti-fragility and Perceived Insider Status (PIS)

Perceived insider status (PIS) is a nuanced psychological construct that captures the degree to which employees feel recognized and valued as integral members of their organization (Stemper & Masterson, 2002). PIS underscores the subjective experience of belongingness and inclusion within the organization. Empirical studies have demonstrated that perceived insider status is significantly associated with a range of positive organizational outcomes, such as enhanced job satisfaction, heightened organizational commitment, and diminished turnover intentions (Khan, 2021).

Employees with a strong sense of insider status are more inclined to engage in organizational citizenship behaviors, driven by a deeper alignment with the organization's goals and values (Carolissen, 2012). As organizations increasingly prioritize diversity and inclusion, a deeper understanding of perceived insider status is essential for optimizing workforce potential and achieving strategic objectives (Wei et al., 2020).

Anti-fragility involves the capacity to thrive and grow in response to volatility and stressors, which may enhance employees' sense of belonging and integration. Anti-fragile employees who leverage uncertainty for personal and professional growth are more likely to feel valued and integral to their organizations (Nakash & Bouhnik, 2021). Organizations cultivating anti-fragile cultures often promote psychological safety, which is crucial for employees to feel secure and accepted as insiders (Guo et al., 2020). Such environments encourage open communication and risk-taking, allowing employees to contribute meaningfully and feel more connected to organizational goals (Guo et al., 2020). The adaptive and resilient nature of anti-fragile employees can lead to enhanced perceptions of insider status, as they are seen as valuable contributors during times of change and uncertainty (Kenno et al., 2015). Additionally, employees with high anti-fragility may have a strong sense of self-efficacy and confidence in coping with workplace challenges, which may increase their trust in the organization and reinforce their sense of membership (Guo et al., 2020). Individuals with strong anti-fragility find opportunities in change and uncertainty, helping them adapt and innovate to maintain high levels of work participation (Nakash & Bouhnik, 2021). Therefore, in light of the discussion above, the following hypothesis is proposed:

H2: Anti-fragility may positively influence the perceived insider status.

2.3 Perceived Insider Status and Employee Engagement

Employees' perception of insider status, emphasizing the subjective experience of belongingness and inclusion within the organization, may promote employee engagement (Yuan et al., 2021). Perceived insider status is significantly associated with a range of positive organizational outcomes, such as enhanced job satisfaction, increased organizational commitment, and diminished turnover intentions (Aldabbas and Bettayeb, 2023; Kong et al., 2019). Employees with a strong sense of insider status are more inclined to engage in organizational behaviors, driven by a deeper alignment with the organization's goals and values (King et al., 2021). Moreover, perceived insider status has been shown to cultivate a more cohesive and motivated workforce, underscoring its role as a pivotal psychological mechanism within the workplace (Ariza-Montes et al., 2021). As organizations increasingly prioritize diversity and inclusion, a thorough understanding and enhancement of perceived insider status are essential for optimizing workforce potential and achieving strategic objectives (Tian et al., 2022). Therefore, in light of the discussion above, the following hypothesis is proposed:

H3: Perceived insider status may positively influence employee engagement.

2.4 Mediation Role of Perceived Insider Status

Perceived insider status, which reflects an employee's sense of being an integral and valued member of the organization, has been shown to enhance engagement by fostering a deeper emotional and cognitive connection to the organization (Dong et al., 2020; He et al., 2014). Faced with risk and stress, employees with anti-fragility are able to further enhance their knowledge and capabilities, combine their goals with organizational targets, take full advantage of organizational resources and support, and improve their work performance positively (Kenno et al., 2015). Moreover, the supportive and inclusive culture fostered by anti-fragile practices can strengthen PIS by ensuring fair treatment and recognition, which are crucial for employees to feel like insiders (Nakash & Bouhnik, 2021; Hassi, 2018). Employees with strong anti-fragility may show a higher sense of commitment to the organization, because they are able to better understand the challenges and opportunities and thus participate more actively in their work (Stemper & Masterson, 2002). Therefore, in light of the discussion above, the following hypothesis is proposed:

H4: Perceived insider status may mediate the relationship between anti-fragility and employee engagement.

2.5 Theoretical Framework

Anti-fragility theory presents a paradigm shift in understanding how systems respond to volatility, uncertainty, and stressors (Munoz et al. 2022). Unlike resilience, which denotes the ability to withstand shocks without changing, or robustness, which implies resistance to change, anti-fragility describes systems that improve and thrive when exposed to challenges and disruptions (Vera & Sanchez-Cardona, 2021). Anti-fragility theory suggests that employees may benefit from adopting strategies that embrace uncertainty and foster innovation through iterative learning and adaptation in organizational contexts.

Based on anti-fragility theory, the theoretical model is depicted in Figure 1. Anti-fragility theory emphasizes how individuals, organizations, and systems may not only survive but grow and make progress in uncertain and stressful environments (Vera & Sanchez-Cardona, 2021). Therefore, the study aims to explore the relationship between anti-fragility, perceived insider status, and employee engagement, provide empirical support for the advancements in the theory, and develop an understanding of the impact mechanism of anti-fragility.

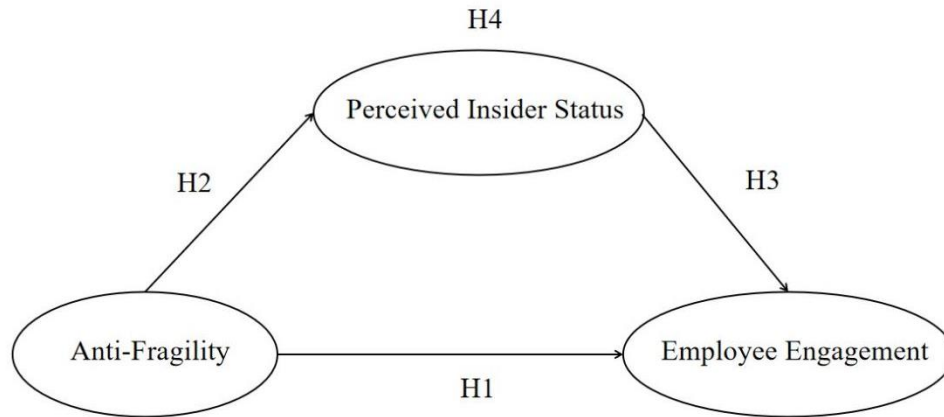


Figure 1. Theoretical model

3. Methodology

3.1 Measurement Items

The questionnaire consisted of two major sections. The first part was demographic characteristics, which included respondents' age, gender, and education level. The research variables measured by mature scales were covered in the second part. The scale of anti-fragility was developed by Jaaron and Backhouse (2015), including 8 items, for example, "I tend to bounce back quickly after hard times". The scale of perceived insider status was tested by 6 items from Stamper and Masterson (2002) with the sample item as "I am immersed in my work". Employee engagement was measured by items developed by Schaufeli et al. (2006), consisting of 8 items, of which sample item includes "I feel I am an 'insider' in my work organization". The items in the questionnaire were evaluated by the Likert 5-point scale, and unambiguous expression was employed to minimize misunderstanding (as shown in Table 1).

Table 1. Measurement and references

Factors	Items	References
Anti-fragility	AF1: I tend to bounce back quickly after hard times.	Jaaron & Backhouse, 2015
	AF2: I have a hard time making it through stressful events.	
	AF3: It does not take me long to recover from a stressful event.	
	AF4: It is hard for me to snap back when something bad happens.	
	AF5: I usually come through difficult times with little trouble.	
	AF6: I tend to take a long time to get over setbacks in my life.	
	AF7: When I work, I feel energetic.	
	AF8: When I get up in the morning, I am happy to go to work.	
Employee engagement	EE1: At my work, I feel bursting with energy.	Schaufeli et al., 2006
	EE2: I am enthusiastic about my job.	
	EE3: My job inspires me.	
	EE4: When I get up in the morning feels like going to work.	
	EE5: I feel happy when I am working intensely.	
	EE6: I am proud of the work that I do.	
	EE7: I am immersed in my work.	
	EE8: I get carried away when I am working.	
Perceived insider status	PIS1: I feel very much a part of my work organization.	Stamper & Masterson, 2002
	PIS2: My work organization makes me believe that I am included in it.	
	PIS3: I feel like I am an ‘outsider’ at this organization.	
	PIS4: I don’t feel included in this organization.	
	PIS5: I feel I am an ‘insider’ in my work organization.	
	PIS6: My work organization makes me frequently feel ‘left-out’.	

3.2 Pre-survey

The pre-research was surveyed from 19th December 2023 to 25th January 2024 to identify potential biases and refine the questionnaire based on feedback. A total of 150 surveys were issued, and 145 were found to be valid. The effective questionnaire ratio was 90%. It was found that Cronbach’s α values of “anti-fragility”, “perceived insider status” and “employee engagement” scale were respectively 0.942, 0.845, and 0.923, greater than 0.700. The findings manifested that the internal consistency of each variable was satisfied. Thus, all items of the questionnaire were retained as a formal questionnaire.

3.3 Data Collection and Analysis

The research surveyed employees of the hotel and tourism business in four- or five-star luxury hotels, such as Hilton Hotels in Beijing, Shanghai, Hangzhou, and Qingdao. Hilton Hotels recognized globally for its significant impact and strong brand image serves as a sample for enhancing credibility and external validity. The study benefits from the Hilton Hotels’ established reputation and extensive operational framework, which provide a robust context for exploring organizational and individual issues.

Data was collected with the sojump platform, which allows for efficient distribution and collection of responses and sends reminders to non-respondents to improve participation. The uncertainties and pressures faced by the hotel industry are unique, such as the transformation of customers’ demand, growing market competition, seasonal factors, etc.

The research time was January 2024, the target respondents were employees responsible for management and administration with more than 2 years of working experience. The participants were informed about the anonymity and confidentiality of their responses to encourage honest and unbiased participation. In order to improve the validity

of the questionnaire, a total of 749 questionnaires were issued by hotel managers by email, and invalid questionnaires, such as incomplete information, contradictory responses, and straight-lining answers, were removed. Finally, 526 valid surveys were retained for further analysis. The effective questionnaire ratio was 70.22%. SPSS and AMOS were employed to analyze the obtained data. In order to determine whether the results were affected by the subject consistency, the Harman single-factor test was employed to prove that there was no common method bias.

4. Results

4.1 Descriptive Analysis

The basic information of the samples was as follows: from the perspective of gender, males accounted for 45.5% of the population and females made up 55.5%. Moreover, the independent sample T-test confirmed that the data of males and females had no significant difference in the main research variables, so there was no influence on the validity of the research conclusion. In terms of age, 63.2% of respondents were under 28 years old, which reflected that the sample was young relatively. In terms of academic qualifications, the proportion of undergraduate students was the highest, accounting for 49.2%, which indicated that the respondents were highly educated. Generally, the sample selected in the study may represent the basic situation of employees, and meet the requirements of the study.

4.2 Reliability and Validity Analysis

The results of the reliability test demonstrated that the reliability level was acceptable since Cronbach's α values of "anti-fragility", "perceived insider status" and "employee engagement" were respectively 0.939, 0.872, and 0.918, greater than 0.700. In addition, the KMO values were 0.839, 0.828, and 0.813, greater than 0.8, which demonstrated that there were strong correlations among variables. Therefore, the measurement scales were suitable for factor analysis.

The confirmatory factor analysis (CFA) was applied for validity analysis to examine the variables and measurement scale. According to Table 2, χ^2/df was between 3.4 and 4.1, $p < 0.001$, RMSEA < 0.08 , and the values of GFI, AGFI, IFI, TLI, and CFI were greater than 0.90. The findings demonstrated that the fitting validity of the scale was acceptable.

Table 2. CFA fitting indicators

Factors	χ^2	χ^2/df	GFI	RMSEA	AGFI	IFI	TLI	CFI
Anti-Fragility (AF)	357.4	3.472	0.902	0.074	0.946	0.865	0.894	0.911
Perceived insider status (PIS)	169.1	4.069	0.903	0.052	0.971	0.911	0.903	0.911
Employee engagement (EE)	57.9	3.956	0.961	0.069	0.986	0.988	0.928	0.959

4.3 Correlation Analysis

Pearson correlation coefficient was employed to verify the linear correlation among variables, and the findings are shown in Table 3. It indicated that there was a substantial correlation between anti-fragility and perceived insider status ($r=0.736$, $P < 0.01$), between perceived insider status and employee engagement ($r=0.884$, $P < 0.01$), and between anti-fragility and employee engagement ($r=0.742$, $P < 0.01$). Therefore, hypotheses 1, 2, and 3 were verified preliminary.

Table 3. Correlation coefficients, reliability, AVE, mean, and S.D

Factors	Anti-Fragility (AF)	Perceived Insider Status (PIS)	Employee Engagement (EE)
Anti-Fragility (AF)	1.000		
Perceived Insider Status (PIS)	0.736**	1.000	
Employee Engagement (EE)	0.741**	0.884**	1.000
Reliability	0.944	0.869	0.917
AVE	0.625	0.781	0.766
Mean	5.438	4.956	5.397
S.D.	0.911	1.129	1.056

Note: * $p < 0.05$, ** $p < 0.01$

Additionally, it found that the correlation between PIS and EE reached 88.4%, indicating collinearity. Thus, a variance inflation factor (VIF) analysis was conducted to ensure the validity of the findings. The results indicated that the VIF values for both PIS and EE were below the threshold of 10, suggesting that collinearity was not a potential issue.

4.4 Regression Analysis

4.4.1 The Influence of Anti-fragility and Perceived Insider Status on Employee Engagement

Based on the results of correlation analysis, regression analysis was further carried out. As shown in Table 4, the regression coefficient of anti-fragility on perceived insider status was 0.836 ($P < 0.01$), and the F value was 235.220, which indicated that the linear regression equation of variables was significant. The adjusted R^2 was 48.1%, which manifested that anti-fragility could explain 48.1% of perceived insider status in the regression equation. It showed that the correlation between the anti-fragility and perceived insider status was significantly positive, and H1 was verified.

The regression coefficient of perceived insider status on employee engagement was 0.954 ($P < 0.01$), and the F value was 410.865, indicating that there was a significantly positive correlation between perceived insider status and employee engagement, and H2 was verified. With the improvement of perceived insider status, employees may become more engaged in their work and develop a greater sense of belonging.

The regression coefficient of anti-fragility on employee engagement was 0.978 ($P < 0.01$), the F value was 257.438, and the adjusted R^2 was 55.7%, which meant that anti-fragility might explain 55.7% employee engagement. It manifested that the correlation between anti-fragility and employee engagement was significantly positive, and H3 was verified.

Table 4. Regression analysis results of variables

Factors	Perceived Insider Status (PIS)		Employee Engagement (EE)		Employee Engagement (EE)	
	β	T value	β	T value	β	T value
Anti-Fragility (AF)	0.836	16.463**			0.978	15.814**
Perceived Insider Status (PIS)			0.954	19.481**		
R ²	0.694		0.783		0.717	
Adjusted R ²	0.481		0.641		0.557	
F value	235.220**		410.865**		257.438**	

4.4.2 Test of Mediating Effect

The hierarchical multiple regression was employed for statistical analysis to verify the mediating function of perceived insider status. As presented in Table 5, the regression equation results of the mediating effect showed that the F value was 247.518 ($P < 0.01$), indicating that the regression equation was significant. First of all, there was a significant effect of perceived insider status on employee engagement, which was evidenced by the regression coefficient of perceived insider status on employee engagement was 0.755 ($P < 0.01$) as a mediating variable. Secondly, the regression coefficient of anti-fragility on employee engagement was 0.542 ($P < 0.01$), which proved that there was a substantial influence of anti-fragility on employee engagement.

In the regression model, the regression coefficients of anti-fragility on employee engagement were significant by adding the mediating variable, perceived insider status. The value was lower than that in Table 4, which manifested that the regression coefficient of perceived insider status was significant, and the mediating effect was verified, so, H4 was established. It indicated that organizations should encourage and improve employees' anti-fragility and perceived insider status, which might enhance the level of employee engagement significantly.

Table 5. Regression analysis results of the mediating effect

Types of variables	Variables	Employee Engagement (EE)	
		β	T value
Independent variable	Anti-Fragility (AF)	0.542	6.699***
Mediating variable	Perceived Insider Status (PIS)	0.755	11.227**
	R ²	0.647	
Regression model	Adjusted R ²	0.426	
	F value	247.518**	

5. Discussion and Conclusion

The study explores the effect of anti-fragility on employee engagement with the mediating role of perceived insider status. According to the statistical analysis, the theoretical model and relevant hypothesis are verified. The conclusions are as follows:

First of all, employees' anti-fragility has a significantly positive effect on engagement, which suggests that anti-fragility is a strong predictor of employee engagement. The fast-changing environment may encourage employees to get sensitive to the fierce competition and their sense of pressure, and make spontaneous innovation and active breakthroughs, which may help their organizations catch the opportunity to achieve sustainable development. Employees with anti-fragility may have positive attitudes and ways to deal with the influence of COVID-19 and intelligent automation. They tend to maintain work enthusiasm and engagement, perceive the support of the company and colleagues, and create value actively. Improved anti-fragility may help employees to enhance

their ability to resist, develop, and adapt by capitalizing on uncertainty and potential risks. The findings are consistent with previous findings (Wen et al., 2022; Borst et al., 2020). The conclusions may further develop the effect of anti-fragility on employee engagement and provide an innovative perspective for future research.

In addition, perceived insider status may motivate employees to engage in positive work behaviors, because they take themselves as part of their organizations. After perceiving trust and recognition from organizations, employees may be more inclined to contribute their efforts, which is consistent with previous studies (Khan, 2021; King et al., 2021; Patel et al., 2020). Employees who feel like they belong in the organization may obtain a higher sense of job security, which reduces their anxiety and allows them to focus on job engagement. It aligns with Stamper and Masterson's (2002) findings that perceived insider status is bolstered by promoting a culture of resilience, adaptability, and inclusion. When employees regard themselves as an insider in an organization, they feel a stronger sense of belonging and identity, which may enhance their commitment and engagement at their work. The mediating role of PIS underscores its importance in maximizing the positive effects of anti-fragility on employee engagement, suggesting that organizations should focus on enhancing PIS to fully realize the benefits of anti-fragility.

Finally, employees' anti-fragility leads to a significant and positive impact on engagement through perceived insider status. The beneficial effect of anti-fragility on employee engagement might be advanced in the background of perceived insider status. Employees with strong anti-fragility are better able to adapt to changes in organizational culture and work environment, which helps them better participate in the work. Anti-fragility may help employees employ organizational resources more effectively, which makes them feel that they are important members, and thus believe that the organization supports them more. The findings are consistent with previous findings, such as Khan et al. (2020), and Nakash and Bouhnik (2021). The perception encourages them to further participate in the work in return for the trust and support offered by their organizations. Supported by the organization, employees may become more engaged and enthusiastic about their work, and achieve a higher level of job satisfaction.

As the business market becomes increasingly complex and unpredictable, the anti-fragility theory offers valuable insights for not only enduring but also prospering in adversity. Employees with better anti-fragility might reduce their helplessness and anxiety, and perceive greater commitment to their companies and organizations, which helps develop positive attitudes and improve their engagement. The positive correlation between anti-fragility and employee engagement might be moderated by perceived insider status. Faced with difficulties and challenges, employees take advantage of anti-fragility and organizational support, and gain recognition and reward for their efforts, thus improving their insider status perception and engagement.

6. Implications and Future Research

6.1 Theoretical Implications

The study advances the theoretical development of anti-fragility by demonstrating its relevance in organizational behavior and providing an understanding the impact of anti-fragility on employee engagement through perceived insider status.

Firstly, a more innovative and systematic theoretical framework was developed to explain the mechanism, influencing factors, and the impact mode of anti-fragility in different contexts. The concept of anti-fragility applied in systems and risk management traditionally is integrated with organizational behavior theories, which broadens the scope of anti-fragility, demonstrating its relevance and applicability in enhancing employee engagement within organizational settings. The study encourages organizations to view challenges as opportunities for growth, aligning with contemporary needs for adaptability and innovation, and contributes to the broader discourse on organizational resilience by positioning anti-fragility as a proactive approach to managing change and uncertainty. The findings may help to develop an understanding of uncertainty for individuals, organizations, and even societies, and offer guidance for improving abilities to face and solve various risks and challenges.

Secondly, the study explores the influence of employees' anti-fragility on engagement in the context of rapidly updated technologies, which may further enrich the theoretical basis of relevant research. The rapid development of intelligent technology has brought significant impacts and changes to work and life. Based on the context, the study considered anti-fragility as the antecedent variable of engagement, which revealed the importance of anti-fragility for employees to maintain and improve engagement, improved the cognition of anti-fragility, provided empirical evidence and new perspectives to explore the factors affecting employee engagement. The study contributes to the development of the anti-fragility theory by extending its application to organizational behavior, specifically in the context of employee engagement. Studies on employees' anti-fragility may play a multifaceted role in developing knowledge of risk management, and explore the role of anti-fragility on their engagement. The findings provide

empirical evidence supporting the relationship between anti-fragility and employee engagement, thereby strengthening the theoretical foundation.

Thirdly, the study may expand the research on perceived insider status by the analysis of intermediary mechanisms. The developments of technology have changed the physical and psychological work environment. In this context, employees' anti-fragility may help them maintain a sense of control and belonging, which may further promote professional behavior. By identifying perceived insider status as a mediator, the study highlights a psychological mechanism through which anti-fragility influences employee engagement. The results may develop the research on antecedent variables of perceived insider status and the effect of anti-fragility, and further clarify the impact mechanism of anti-fragility on employee engagement. It develops the anti-fragility theory by illustrating how individual perceptions of belonging and inclusion can enhance the positive effects of anti-fragility on employee outcomes. When employees' insider perception is strong, their anti-fragility may affect engagement positively. The discovery may inspire researchers to pay further attention to the positive effect of perceived insider status on engagement and its mechanisms.

6.2 Practical Implications

Firstly, the hotel and tourism industry may help employees to develop anti-fragility quality. Managers may improve employees' psychological skills and anti-fragility by management innovation to cope with difficulties actively, for instance, by posting positive information, providing work guidelines, and arranging psychological training. It may encourage employees to engage in their jobs with more courage and power and improve their insider status perception to develop harmonious interpersonal relationships. Promoting employees' anti-fragility, perceived insider status, and engagement is beneficial for the recovery and growth of business. The findings may provide greater ideas for developing anti-fragility mechanisms in the hotel and tourism industries, which may help to improve employees' and organizations' adaptability in risky situations.

Secondly, the hotel and tourism industry may develop a cooperative culture to promote employee engagement. In the context of a public crisis, employees' anti-fragility helps to promote the development of perceived insider status and improve their engagement. For example, managers may make use of modern information technology to help employees develop a higher level of freedom and accomplishment, and promote their potential and responsibilities; arrange interesting team-building activities and informal motivation to improve employees' insider status perception and engagement. Rapid changes in the business environment may lead to a high level of uncertainty in organizations, which requires employees' initiative in the uncertain context.

Thirdly, faced with a public crisis and technological revolution, the hotel and tourism industry may take responsibility and improve engagement for employees. Perceived insider status is a positive experience for employees, which may motivate them to engage in active behaviors in their daily work, thus promoting organizations' capabilities to cope with uncertainty. The hotel and tourism departments may create feasible conditions to provide learning opportunities and psychological assistance services, in order to support employees, create a trusting and belonging circumstance, and reduce their concerns and worries about work. For example, faced with challenges and changes, employees may be encouraged to develop a sense of crisis, maintain a moderate level of pressure, and keep a life-long learning attitude.

6.3 Limitations and Future Research

Several limitations should be acknowledged. Firstly, the study was cross-sectional, which limits the ability to infer causality between the variables studied. Future research should employ longitudinal or experimental designs to better establish causal relationships. Secondly, Hilton Hotels in Beijing, Shanghai, Hangzhou, and Qingdao were selected as the sample, which may limit the generalizability of the findings. Future studies should consider including a more diverse range of industries and geographic locations to test the applicability of the conclusions across different contexts. Thirdly, the mediating effect of perceived insider status was primarily examined, however, potential confounding variables were not considered. Future research may explore other potential mediating variables and moderating variables, such as innovative self-efficacy, organizational culture, and leadership style, to further understand the impact of positive psychological qualities in shaping employee engagement.

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Authors' contributions

Muhammad Junaid Bashir: Writing – original draft, Methodology, Data curation, Conceptualization. **Haiyan Kong:** Writing – original draft, Conceptualization, Supervision. **Naipeng Bu:** Writing – review & editing, Methodology. **Fei Hao:** Writing – review & editing. **Saddam Hussain:** Review & editing.

Competing interests

The authors report no conflicts of interest in this article.

Informed consent

Obtained.

Ethics approval

The Publication Ethics Committee of Sciedu Press.

The journal and publisher adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

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Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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