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The Effect of STARA Awareness on Entrepreneurial Intentions of Employees:

The Mediating Role of Perceived Opportunity and Perceived Risk

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Abstract
This study examines the influence of STARA awareness on employees' entrepreneurial intentions, focusing on the mediating effects of perceived opportunities and risks. A survey was conducted among frontline employees in AI and intelligent manufacturing companies in China's Pearl River Delta. PLS-SEM was applied to analyze the data. The findings reveal that STARA awareness positively influences perceived opportunities and negatively affects perceived risks, mediating the relationship with entrepreneurial intentions. Entrepreneurial alertness moderates the relationship between STARA awareness and perceived opportunities and risks. STARA awareness can stimulate entrepreneurial intentions through the dual pathways of perceived opportunities and risks. Enhancing employees' STARA awareness and entrepreneurial alertness could be strategic for organizations to foster innovation and entrepreneurship amidst technological advancements.

Keywords
STARA awareness, Entrepreneurial Intentions, Perceived Opportunity, Perceived Risk

INTRODUCTION

In the 21st-century wave of technological advancements, Smart Technology, Artificial Intelligence, Robotics, and Algorithms (STARA) are transforming traditional business models (Brougham & Haar, 2018). At the core of STARA is Artificial Intelligence (AI), which, through breakthroughs in deep learning, natural language processing, and computer vision, surpasses the limitations of traditional programming to perform more complex tasks (LeCun et al., 2015). Advances in robotics are also creating new opportunities for human-machine collaboration and workplace automation (Başer et al., 2024; Poba-Nzaou et al., 2021). At the same time, the rapid iteration of algorithms has enhanced data processing capabilities, enabling smarter decision-making (Jordan & Mitchell, 2015). Automation, intelligence, human-machine collaboration, and data-driven decision-making are defining characteristics of this era. These trends are reshaping how people work, learn, manage, and interact, becoming strategic levers for enhancing competitive productivity (Baumann et al., 2021; Da Silva et al., 2022). These technologies not only boost productivity but also create entirely new business models, impacting industries such as manufacturing, services, healthcare, finance, and education (Brynjolfsson & McAfee, 2014; Ding, 2022). The evolving STARA paradigm is driving society into the "Fourth Industrial Revolution" (Ammirato et al., 2023).

STARA has a multifaceted impact on the labor market. On one hand, it has created new professions such as data scientists, machine learning engineers, and robotics maintenance technicians (McAfee & Brynjolfsson, 2016). On the other hand, the rise of automation and intelligence has led to a reduction in highly repetitive, low-skill jobs (Chen & Cai, 2024; Fleming, 2019; Van Looy, 2020). This job displacement phenomenon has raised concerns about job security, prompting policymakers and companies to emphasize employee retraining and skill development. To enhance competitiveness and achieve sustainable development goals, companies must adopt STARA technologies (Ding, 2021). Research shows that introducing robots in the service industry can significantly improve customer satisfaction and experience (Chen & Cai, 2024; Van Looy, 2020; Xu et al., 2023). Even when robots underperform due to malfunctions, customers show a high level of tolerance, and overall satisfaction with the business remains unaffected (Borghi et al., 2023). However, for employees, the use of robots in the workplace can lead to feelings of job insecurity, mental and physical fatigue, burnout, and increased turnover intentions (Xu et al., 2023). This gave rise to the concept of STARA awareness. Brougham and Haar define STARA awareness as employees' perception of how STARA will impact their future career prospects (Brougham & Haar, 2018). STARA awareness influences people's acceptance of these technologies, ultimately shaping their behavior in adopting them. Differences in technology adoption behaviors affect the transformation of social and economic structures. This technology-driven shift is reshaping how people work, live, and interact, pushing society to rethink the future of coexisting with technology. Shortly after the advent of computers, scholars predicted that 47% of U.S. jobs would be replaced by computers (Frey & Osborne, 2017). Today, similar predictions have resurfaced with the rise of STARA technologies. Scholars now predict that STARA will accelerate the displacement of traditional jobs, potentially replacing one-third of human positions (Yudiatmaja et al., 2021). However, looking back, despite the continual rise of computers, jobs have not vanished. Instead, people have leveraged computers to boost productivity and create new employment opportunities (Fleming, 2019).

Similarly, the impact of new technologies in the entrepreneurial environment is viewed from two perspectives. On one hand, technological advancements have lowered the barriers to entry for startups (Neumeyer et al., 2021). In the workplace, new technologies replace low-skill tasks with automation (Aghion et al., 2008; Herman, 2020), freeing up time for individuals to focus on developing new products and services (Doganova & Eyquem-Renault, 2009). On the other hand, the uncertainty of technology, market saturation, and concerns over data privacy and security (McAfee & Brynjolfsson, 2016), have sparked global social, economic, and environmental crises, such as lost opportunities, rising unemployment, widening inequality, and increased social exclusion (Soueidan & Shoghari, 2024). To navigate these challenges, individuals must have a deep understanding of technology and the ability to adapt to the market. In summary, the continual evolution of new technologies presents both opportunities and threats to entrepreneurs (Neumeyer et al., 2021).

The Theory of Planned Behavior (TPB) suggests that intention is the most direct antecedent of behavior (Ajzen, 1991). In the context of entrepreneurship, entrepreneurial intention explains why and how individuals engage in entrepreneurial activities. It reflects not only their interest or preference for entrepreneurial behavior but also serves as the driving force behind initiating and sustaining the entrepreneurial process. As technological innovations progress, market environments become increasingly complex and diverse. For individuals who view uncertainty as an opportunity, entrepreneurship becomes an effective way to address challenges and seize opportunities. However, technological change often entails high risks and uncertainty, requiring individuals to have strong intentions and motivation to pursue entrepreneurship in such challenging environments (Shane & Venkataraman, 2000). Studies show that individuals with entrepreneurial intentions exhibit more consistent and stable reactions and decisions in the face of uncertainty compared to those without such intentions (Zichella, 2020), they are also more resilient to risk and failure (Kou & Chen, 2024). In contrast, individuals with weaker entrepreneurial intentions are more likely to choose conservative career paths, missing out on the potential benefits of technological advancements. Therefore, understanding individual entrepreneurial intentions in the era of widespread STARA is crucial, as it not only predicts how individuals will respond to technological change but also reveals whether they will choose to leverage these changes for entrepreneurship.

Current research has not yet fully addressed the potential impact of STARA awareness on entrepreneurial intention. While STARA awareness is critical for entrepreneurs and leaders (Ogbeibu et al., 2021), it remains unclear how it stimulates or suppresses entrepreneurial intention from both positive and negative perspectives. Therefore, exploring how STARA awareness affects entrepreneurial intention, particularly through the mechanisms of perceived opportunities and perceived risks, addresses a critical gap in the current research.

Based on the above discussion, this research makes several contributions to the literature in several ways. First, it highlights the significant role of employees' STARA awareness in entrepreneurial intention, enriching the emerging body of literature on the impact of new technologies on entrepreneurial intention. A key finding is that STARA awareness positively influences employees' entrepreneurial intentions. Second, by revealing the dual impact of STARA awareness on entrepreneurial intention, this research extends existing studies on the two-sided effects of STARA awareness. We argue that employees may perceive STARA as presenting new opportunities or as a threat, and these differing perceptions may determine whether STARA awareness increases or decreases entrepreneurial intention. Third, we explored the moderating role of entrepreneurial alertness and found that it moderates the relationship between STARA awareness and both perceived risks and perceived opportunities. This study offers critical insights for organizations and regulators operating in a technology-driven environment, suggesting how enhancing STARA awareness can effectively promote employees' entrepreneurial intention. These findings can help develop more targeted interventions to boost employees'

perception of opportunities and entrepreneurial alertness, thereby stimulating entrepreneurial intention even in the face of technological disruption risks.

LITERATURE REVIEW AND HYPOTHESES

Protection motivation theory

Protection Motivation Theory (PMT), introduced by Rogers in 1975, aims to explain how fear appeals can change individuals' attitudes and behaviors (Rogers, 1975). PMT is based on the Expectancy-Value Theory and posits that individuals undergo two primary cognitive appraisal processes when facing threats: threat appraisal and coping appraisal (Witte, 1992). Threat appraisal involves evaluating the severity and likelihood of the threat, while coping appraisal assesses the perceived effectiveness of coping measures (belief in taking protective actions) and self-efficacy (confidence in carrying out these measures). When individuals perceive a high level of threat severity and probability, and believe that specific coping measures can effectively reduce or eliminate the threat, they develop protection motivation, which then triggers adaptive behavioral intentions or actions (Z. Yin et al., 2024).

PMT has been widely applied in various fields such as health promotion, disease prevention, injury prevention, and environmental risk communication, and has received broad empirical support (Floyd et al., 2000). Floyd et al.'s meta-analysis further confirmed the effectiveness of PMT across various health issues. They found that increasing threat severity, vulnerability, coping effectiveness, and self-efficacy can promote adaptive intentions or behaviors. Conversely, reducing maladaptive rewards and coping costs can also enhance adaptive intentions or behaviors (Floyd et al., 2000). Hunter et al. applied PMT to the field of entrepreneurship, exploring how fear of failure affects individuals' intentions to adopt entrepreneurial strategies through threat appraisal and coping effectiveness. This research provides a new perspective on understanding the motivational role of fear of failure in the entrepreneurial process (Hunter et al., 2021). In the entrepreneurial context, this means that if individuals perceive threats such as market or financial risks, they may take actions to alleviate the fear associated with these threats. Such actions could include increasing awareness of entrepreneurial opportunities, seeking support or resources, and enhancing their skills. These measures can influence their entrepreneurial intentions, as reducing fear and boosting confidence may encourage a more proactive pursuit of entrepreneurial goals (Donaldson et al., 2024). This study uses PMT to explain how STARA awareness affects entrepreneurial intentions by influencing perceived risks and opportunities. This theoretical framework not only helps in understanding individuals' decision-making processes but also provides theoretical support for relevant entrepreneurial interventions.

STARA awareness and entrepreneurship intentions

STARA presents various threats. Renowned physicist Stephen Hawking and several business leaders believe that advances in STARA could lead to job displacement for some individuals, potentially causing widespread unemployment (Brougham & Haar, 2018). Additionally, STARA could lead to potential threats such as privacy breaches and system malfunctions. The application of STARA in the service industry has also become a current issue due to conflicts with frontline workers (Ma & Ye, 2022). Xu et al. (2023) found that the use of service robots in the workplace has had adverse effects on employees, including increased job insecurity, physical and mental exhaustion, burnout, higher turnover intentions, and decreased job satisfaction and engagement. Other studies have indicated that STARA applications evoke varying emotional responses among employees, and their perceptions are not always positive. This negative perception is referred to as robotic risk awareness in recent research (Pan et al., 2025).

STARA presents opportunities, as technological advancements impact the antecedents, processes, and outcomes of entrepreneurship, including how new ideas are generated, markets are developed, and opportunities are exploited (Chalmers et al., 2021)。This indicates that STARA not only changes how entrepreneurs identify and pursue business opportunities, but it may also influence their market strategies and business models. Studies have shown that effective employee training can significantly mitigate the negative effects of job insecurity caused by STARA technology (Mukhlis et al., 2023). Moreover, skilled employees may view the job insecurity brought by STARA as an opportunity, spurring innovation in the workplace (Ding, 2022). Mastering STARA technology may help employees realize that leveraging these technologies can open new market avenues or improve existing business processes, thereby enhancing entrepreneurial appeal (Brougham & Haar, 2018). Employees may be further motivated to innovate, especially when they perceive that these technologies provide them with a competitive edge in entrepreneurship. Through technology-driven innovation, employees may be more inclined to start their own entrepreneurial ventures to capitalize on the new opportunities brought by STARA. In summary, STARA technology presents unprecedented opportunities and challenges in the entrepreneurial field. With proper training and a proactive employee mindset, STARA can serve as a powerful tool to drive innovation and entrepreneurship. Hence, it is hereby hypothesized that:

Hypothesis 1. (H1): STARA awareness will be positively associated with entrepreneurship intentions.

Mederating effect of perceived opportunity and perceived risk

Industries reliant on routine and repetitive tasks have proven to be particularly vulnerable to the impact of STARA technologies. While STARA poses a significant risk of job losses across various sectors, it also offers opportunities for economic growth, new job creation, and innovation (Soueidan & Shoghari, 2024). The influence of STARA awareness on

entrepreneurial intentions depends on an individual's perception of these technologies, including perceived risks and opportunities, and can manifest in two scenarios. On the one hand, if individuals perceive that STARA technologies introduce new market opportunities—such as automation tools that reduce startup costs, enhance productivity, or enable new business models—this awareness may strengthen their entrepreneurial intentions. Individuals may view these technologies as tools for innovation and market leadership, motivating them to pursue entrepreneurial goals more actively. Those with a deep understanding of and confidence in STARA technologies may feel they have the advantage of leveraging these tools, thereby enhancing their entrepreneurial intentions. They may believe that by mastering new technologies, they can gain a competitive edge, making them more willing to engage in entrepreneurship (Stuetzer et al., 2014). On the other hand, if individuals feel uneasy about STARA technologies, fearing they may increase the rate of entrepreneurial failure or heighten competitive pressures (e.g., market saturation due to automation or the need for substantial technological investments), this awareness may dampen their entrepreneurial intentions. This is especially true for those with limited understanding of these technologies or lacking strategies to address them, as they may feel fearful or uncertain, leading them to avoid entrepreneurial risks. The uncertainty and pressures on future career development posed by STARA may also prompt some individuals to opt for more secure career paths rather than risk entrepreneurship. They might believe that in a rapidly changing technological environment, the risks of entrepreneurship are too high, making success difficult to predict (Tsai et al., 2016). Therefore, the impact of STARA awareness on entrepreneurial intentions is complex and bidirectional—it can either enhance or diminish intentions depending on how individuals perceive technological opportunities and risks. Research must consider the interaction of these factors to fully understand the impact of STARA awareness on entrepreneurial intentions. Hence, it is hereby hypothesized that:

Hypothesis 2. (H2): Perceived opportunity has a mediating effect on the influence of STARA awareness on entrepreneurship intentions.

Hypothesis 3. (H3): Perceived risk has a mediating effect on the influence of STARA awareness on entrepreneurship intentions.

Moderating effect of entrepreneurial alertness

Entrepreneurial alertness, based on the theory proposed by economist Israel Kirzner, is widely recognized as the ability to identify market opportunities and assess risks (Kirzner, 2009; Tang et al., 2012a). Early research focused on the external manifestation of opportunity recognition. Over time, scholars expanded the concept, turning their attention to the underlying cognitive processes and psychological mechanisms (Chavoushi et al., 2021). Entrepreneurial alertness can be categorized into external and internal dimensions. External alertness focuses on opportunities in the external environment, while internal alertness relates to the entrepreneur's awareness and thought processes (Wang et al., 2024). During the entrepreneurial process, entrepreneurial alertness, as a cognitive capability, aids entrepreneurs in identifying opportunities within complex and evolving environments by scanning and searching, associating and connecting, and evaluating and judging (Wang et al., 2024). It may also influence how entrepreneurs perceive opportunities and risks in varying contexts (Lanivich et al., 2024). Hence, it is hereby hypothesized that:

Hypothesis 4. (H4): Entrepreneurial alertness positively moderates the relationship between STARA awareness and perceived opportunity.

Hypothesis 5. (H5): Entrepreneurial alertness positively moderates the relationship between STARA awareness and perceived risk.

We propose the research model depicted in Fig 1, which is grounded in the literature review and formulated hypotheses.

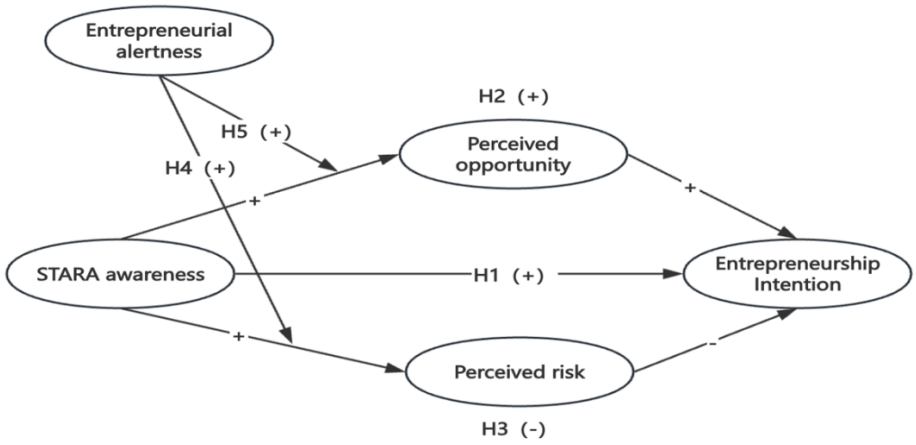

Fig 1. The research model

METHODS

Sampling, data collection and survey instrument

The study's participants were required to have experience working with STARA. Therefore, frontline employees in AI and intelligent manufacturing companies located in the Pearl River Delta region of Guangdong Province, China, were selected. The Pearl River Delta was chosen because China's intelligent manufacturing sector is concentrated in regions

with well-developed industrial infrastructure, and this area is a representative hub for the industry. To ensure data representativeness, and following the approach of other scholars, respondents were asked the following question before completing the survey: "Has your company implemented AI technology in its operations?" Only those who answered "yes" were allowed to proceed; otherwise, the survey was terminated (Ma & Ye, 2022). Convenience sampling was employed for data collection, using both online and offline methods. Online surveys were distributed via WeChat, and offline responses were collected through in-person assistance with questionnaire completion. Additionally, participants were encouraged to forward the survey to eligible colleagues. As a result, the exact response rate could not be determined, as some questionnaires were completed voluntarily. All respondents were Chinese, and since the scales used in the survey were originally in English, the back-translation method was employed to ensure the validity of the Chinese version before distribution. A sufficient sample size is critical for the validity of the model and the reliability of the results. A total of 340 questionnaires were collected, with 15 invalid responses removed, resulting in 325 valid responses. This sample size meets the requirement of being at least ten times the number of parameters in the SEM (Sun & Ma, 2022). Table 1 summarizes the respondents' profile.

The scales used in this study were adapted from previous research. The STARA awareness scale was adapted from Hur and Shin (2024) and consists of four items. The perceived opportunity scale includes five items adapted from Hassan et al. (2020). The perceived risk scale was measured using three items, adapted from Hansen et al. (2018) and Seo and Lee (2021). Entrepreneurial alertness was measured with thirteen items from Tang et al. (2012b). The entrepreneurship intentions scale consists of five items, adapted from Kou and Chen (2024). All scales were rated using a 7-point Likert scale, where 1 indicates "strongly disagree" and 7 indicates "strongly agree".

Table 1 Respondents' profile

Demographic Factors	Descriptive Statistics
Gender	Male: 189(58.2%) Female: 136(41.8 %)
Age	Under 18: 5(1.5%) 18–30 years: 174(53.5%) 31–40 years: 66(20.3%) 41–50 years: 66(20.3%) Over 50:14(4.3%)
Education Level	High school or below:13(4.0%) Associate degree:49(15.1%) Bachelor's degree:194 (59.7%) Master's degree: 40(12.3%) Doctorate:29(8.9%)
Years of Work Experience	Less than 2 years (not including 2 years):60(18.5%) 2–5 years (not including 5 years):141(43.4%) 5–10 years (not including 10 years):101(31.1%) 10 years or more:23(7.1%)

Note: N = 325

Data analysis

Structural Equation Modeling (SEM) can be categorized into two types: CB-SEM and PLS-SEM. Compared to CB-SEM, PLS-SEM requires a smaller sample size and can analyze complex models by reflecting measurement items onto latent constructs (J. F. Hair et al., 2019; Kou & Sun, 2024). Given these reasons and the complexity of the model in this study, PLS-SEM was chosen for data analysis, using SmartPLS 4.0 software. Specifically, the data analysis process consisted of four steps. First, the measurement model was tested, followed by an analysis of the structural model and hypothesis testing. Second, the mediating effects and strength of perceived opportunity and perceived risk were examined. Third, the moderating effect of entrepreneurial alertness was assessed. Additionally, demographic analysis was conducted using Jamovi software.

RESULTS AND DISCUSSIONS

Measurement model

The measurement model was evaluated by examining the reliability and validity of the constructs (J. F. Hair et al., 2019). Table 2 presents the factor loadings for each item, along with the Cronbach's alpha (CA), average variance extracted (AVE), composite reliability (CR) and the Heterotrait-monotrait ratio (HTMT) test for the constructs. Table 2 shows the results indicate that both the CA (ranging from 0.836 to 0.950) and the CR (ranging from 0.839 to 0.957) exceed the recommended minimum threshold of 0.70 (J. Hair et al., 2014). At the same time, the AVE are greater than 0.500. Table 3 shows that the HTMT values between latent variables are all less than 0.85, indicating good discriminant validity of the scales (Henseler et al., 2016).

Table 2 Convergence validity

Construct	Item	Outer Loading	CA	CR	AVE
STARA awareness	STARA1	0.816	0.854	0.854	0.691
	STARA2	0.789			
	STARA3	0.869			
	STARA4	0.848			
Perceived Opportunity	PO1	0.815	0.853	0.853	0.626
	PO2	0.848			
	PO3	0.701			
	PO4	0.743			
	PO5	0.840			
Perceived Risk	PR1	0.879	0.839	0.839	0.753
	PR2	0.845			
	PR3	0.878			
Entrepreneurial Alertness	EA1	0.804	0.957	0.957	0.625
	EA2	0.812			
	EA3	0.812			
	EA4	0.830			
	EA5	0.832			
	EA6	0.771			
	EA7	0.759			
	EA8	0.773			
	EA9	0.808			
	EA10	0.782			
	EA11	0.733			
	EA12	0.759			
	EA13	0.793			
Entrepreneurship Intentions	EI1	0.851	0.922	0.922	0.758
	EI2	0.877			
	EI3	0.885			
	EI4	0.872			
	EI5	0.866			

Note: Items measured on a scale ranging from 1 "strongly disagree" to 7 "strongly agree".
CA = Cronbach Alpha; CR = Composite Reliability; AVE = Average Variance Extracted

Table 3 Discriminant validity

	EA	EI	PO	PR
EI	0.166			
PO	0.345	0.406		
PR	0.361	0.295	0.377	
STARA	0.313	0.038	0.629	0.748

Note: STARA = STARA awareness; EI = Entrepreneurship Intentions; PO = Perceived Opportunity; PR = Perceived Risk; EA = Entrepreneurial Alertness. Discriminant validity achieved at $HTMT_{0.85}$

Structural model

Before evaluating the structural model, we examined the Variance Inflation Factor (VIF) to determine whether multicollinearity was an issue. As shown in Table 4, all VIF values for the paths were below 3, indicating that multicollinearity was not a concern. The path results show that the hypothesis regarding the effect of STARA awareness on entrepreneurial intentions (β = -0.012, P > 0.1) was not supported. In evaluating the mediating role of perceived opportunity, the results indicate that STARA awareness had a significant positive effect on perceived opportunity (β = 0.480, P < 0.001), and perceived opportunity significantly positively impacted entrepreneurial intentions (β = 0.497, P < 0.001). STARA awareness also had a significant positive effect on perceived risk (β = 0.585, P < 0.001), while perceived risk had a significant negative effect on entrepreneurial intentions (β = -0.412, P < 0.001). Thus, H2 and H3 were supported. Additionally, the interaction term between entrepreneurial alertness and STARA awareness had a significant positive effect on perceived opportunity (β = 0.211, P < 0.05) and perceived risk (β = 0.135, P < 0.05), which supported H4 and H5.

CONCLUSIONS

This study examined the mediating role of employees' perceived opportunities and risks in the relationship between STARA awareness and entrepreneurial intention, as well as the moderating effect of entrepreneurial alertness. Most of the research hypotheses were supported. We found a significant relationship between employees' STARA awareness and their entrepreneurial intention. Contrary to some existing research (Başer et al., 2024), our study revealed that employees' STARA awareness can positively influence their entrepreneurial intention through the perception of opportunities, while

Table 4 Structural model

	β	S.E.	T	VIF	R^2	Results
H1: STARA -> EI	-0.012	0.067	0.178^{NS}	2.105	0.285	Not support
H2: STARA -> PO	0.480	0.050	9.678^{***}	1.097	0.361	support
PO -> EI	0.497	0.055	9.064^{***}	1.403		
STARA -> PO -> EI	0.238	0.036	6.698^{***}			
H3: STARA -> PR	0.585	0.037	15.616^{***}	1.097	0.439	support
PR -> EI	-0.412	0.055	7.517^{***}	1.674		
STARA -> PR -> EI	-0.241	0.036	6.617^{***}			
H4: EA x STARA -> PO	0.211	0.067	3.149^{**}	1.022		support
H5: EA x STARA -> PR	0.135	0.062	2.181^{**}	1.022		support

Note: STARA = STARA awareness; EI = Entrepreneurship Intentions; PO = Perceived Opportunity; PR = Perceived Risk; EA = Entrepreneurial Alertness. *p < 0.1; **p < 0.05, ***p < 0.001, NS: not significant

while it may negatively impact their intention by making them aware of the risks associated with technological substitution. However, STARA awareness does not directly promote or suppress entrepreneurial intention. Moreover, the results indicate that entrepreneurial alertness positively moderates the effect of STARA awareness on perceived opportunities and risks, ultimately influencing entrepreneurial intention. These findings suggest that STARA awareness stimulates cognitive responses in employees rather than directly driving entrepreneurial behavior. It primarily influences entrepreneurial intention through mediating variables such as perceived opportunities and risks. If employees recognize market opportunities arising from new technologies or automation through their use of STARA, it may stimulate their entrepreneurial intention. Conversely, if employees distrust these technologies when using STARA, feelings of depression and cynicism may increase (Brougham & Haar, 2018), leading to a decline in entrepreneurial intention. Therefore, it is crucial for companies to stay informed about employees' perceptions of AI applications, as this helps both the organization and its employees adapt to the new processes, operations, policies, and services introduced by STARA (Im & Kim, 2022), When introducing STARA technology in the workplace, a job-relevant service guide should be developed to assist employees in coping with the uncertainties it brings (Di Pietro et al., 2014).

CONTRIBUTION

Theoretical implications

This study offers valuable theoretical insights. First, the findings advance previous research by revealing that STARA impacts employees not only negatively (Brougham & Haar, 2018; Mukhlis et al., 2023) but also positively (Başer et al., 2024; Ding, 2022; Lestari et al., 2023; Olya et al., 2024), confirming STARA's double-edged sword effect (Huang & Gursoy, 2024; M. Yin et al., 2024). Additionally, this study integrates PMT to deepen the understanding of the relationship between STARA awareness and employees' entrepreneurial intentions. PMT primarily examines individuals' cognitive processes and coping behaviors in response to perceived threats. Applying this theory to the STARA context extends its relevance to entrepreneurship. The results confirm that STARA awareness indirectly influences entrepreneurial intention through perceived opportunities and risks, aligning with PMT's core assumptions regarding threat assessment and coping strategies (Au & Tsang, 2022). Furthermore, this study extends these findings by examining the moderating role of entrepreneurial alertness in the relationship between STARA awareness and perceived opportunities and risks. Consistent with the focus on alertness influencing opportunity recognition (Lanivich et al., 2022), the attention to STARA awareness and its impact on entrepreneurial intention introduces a fresh perspective. These findings further expand the theoretical framework of entrepreneurial alertness. Specifically, entrepreneurial alertness, as an individual trait, heightens employees' sensitivity to opportunities and enables them to more effectively evaluate and manage risks. Finally, this study provides a new theoretical framework for understanding employee behavior in the context of emerging technologies. It not only enriches the application of PMT but also offers a new perspective for future research on the relationship between technological replacement and employee entrepreneurial behavior.

Practical implications

The study also offers some practical insights for management. First, it provides guidance for companies and policymakers on how to stimulate employees' entrepreneurial intentions. Numerous studies have shown that fostering entrepreneurial enthusiasm among employees not only strengthens a company's internal innovation capabilities but also enhances resilience in the face of technological change and market challenges. This, in turn, creates more opportunities for long-term growth, which is crucial for companies to survive in rapidly changing environments (Nambisan et al., 2019; Su et al., 2022). Therefore, when introducing or promoting STARA technology, companies can increase employees' entrepreneurial intentions by providing appropriate training and technical support to help them recognize the new opportunities that STARA offers. Secondly, the moderating role of entrepreneurial alertness in STARA awareness offers a new approach for companies to cultivate entrepreneurial talent. Entrepreneurial alertness is positively correlated with innovation and has an indirect impact on financial performance (Tang et al., 2023). Companies can enhance employees' entrepreneurial alertness through targeted training and development programs, enabling them to better identify opportunities and avoid risks in the face of technological changes, thereby boosting their entrepreneurial intentions. Finally, the study's findings provide valuable insights for policymakers designing entrepreneurship incentive policies.

While promoting the adoption of STARA technology, policymakers can develop support programs such as entrepreneurship training and technical consulting. These initiatives can help employees better cope with the disruptions caused by new technologies, reduce their fear of technological displacement, and foster more entrepreneurial activities.

LIMITATIONS AND FUTURE RESEARCH

Although this study has made contributions to theory and practice, it has certain limitations. In terms of data collection, the study used a cross-sectional design where all variables were measured at the same time, which limits the ability to infer causal relationships between them. Future researchers are encouraged to collect data in multiple phases to create longitudinal panel data, which may help establish causal relationships between STARA awareness, perceived risk, perceived opportunities, and entrepreneurial intentions. The second limitation is that the study sample consisted only of employees from specific industries and regions in China. Since the degree of STARA technology adoption varies across industries, the generalizability of the results may be limited. Future research should consider collecting samples from diverse industries and cultural backgrounds to further test the universal impact of STARA awareness on entrepreneurial intentions. The third limitation involves the measurement of perceived opportunities and perceived risks, as these variables were self-reported, making them susceptible to individual biases. Future studies could use interviews to explore the pathways of these variables in more depth, which may enhance the reliability of the findings.

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DECLARATION OF CONFLICT

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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