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Strategic enabler of agile operations - ethical AI climate in SMES

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Abstract
In an increasingly dynamic and competitive business environment, small and medium-sized enterprises (SMEs) are adopting artificial intelligence (AI) to enhance operational agility and decision-making capabilities. Beyond technological adoption, the ethical climate surrounding AI use has emerged as a critical strategic enabler of agile operations. This study examines how an ethical AI climate characterized by transparency, accountability, fairness, and data responsibility supports agility in SME operations. Ethical AI practices foster employee trust, reduce resistance to technological change, and improve the quality and speed of managerial decisions. Moreover, an ethical AI climate enables SMEs to respond effectively to market volatility while maintaining compliance with regulatory and societal expectations. By integrating ethical considerations into AI-driven processes, SMEs can balance innovation with responsibility, thereby achieving sustainable operational agility. The findings highlight that ethical AI is not merely a governance mechanism but a strategic resource that strengthens adaptive capacity and long-term competitiveness in SMEs.

Keywords: Ethical artificial intelligence, agile operations, small and medium-sized enterprises, strategic enablers, organizational ethics

Introduction

Due to technological advancement and unpredictability, SMEs operate in the toughest situations, where there is an immediate need to rethink a unique strategy that should reconfigure the operational processes quickly, respond to technological market signals in real time, and most consequently adopt towards various operational decisions (Sharathchandra & Reddy, 2025; AL-ALosi, 2025) [18, 1]. To m*eet al*l these concerns, the new strategy called "Agile Operations" acts as a critical source of competitive advantage. Many researchers pinned different types of factors, such as digital empowerment, skill reskilling, resilience, etc., as valuable antecedents for enhancing agile operations with maximum profitability (Gupta *et al*., 2025; Oluwamola & Longe, 2025; Rasdi & Baki, 2025; Soudi & Bauters, 2024) [5, 14, 16, 21]. But Artificial Intelligence (AI) has been widely predicted as a critical enabler of operational agility, in which technology alone does not make any advancements in the concept of agility (Shaik *et al*., 2023; Chinnaraju, 2025) [19, 3]. Even though AI-driven analytics and automation are performing numerous operational tasks across SMEs, the increasing reliance on AI has also raised a considerable volume of ethical concerns, which encompass transparency, fairness, and mainly data privacy (Kalleparambil & Akoum, 2025; Ahmad *et al*., 2025) [9]. But to compete in the competitive world of business and to survive in the technological world, SMEs need to implement AI systems (Hussain & Rizwan, 2024) [7]. These concerns made an emergency to think and move beyond a purely technological view of agility and need to travel towards a Human Centric and ethically grounded perspective, and also consistent with the principles of Industry 5.0 (Han *et al*., 2023) [6]. Industry 5.0 mainly emphasizes digital transformation along with human-centricity and responsible innovation in conjunction with technological advancement. Within this concept, AI is not going to act as an independent influencer but will act as a collaborative partner whose output depends on ethical alignment. Thus, an ethical AI climate has come with a clear definition as a shared organizational perception on transparent, accountable, fair usage of AI, which needs to be explored and also needs to be analyzed how it will shape AI-enabled systems along

with organizational behavior (Oluwasanmi *et al*., 2023) [12]. As operational agility plays a vital role in rapid decision making and flexible process adjustments across numerous cross-functional boundaries, it should be many factors such as social, cognitive, engaging with AI insights, and mainly to act under any uncertainty. An ethical AI climate can me*et all* these criteria with positive output by fostering trust in AI recommendations, legitimizing human oversight, and also reducing the various hesitations, ethical ambiguity, and risk-averse behaviours. As this combination of ethical AI and responsible digital transformation is attracting many researchers to examine in an analytical way, but till now, there is a huge gap in researching the combined factors of ethical AI at the organizational climate level to operational agility outcomes, which remains limited, especially in the SME context. To address this major gap, the present research investigates analytically ethical AI climate as a strategic enabler of agile operations in SMEs. As ethical climate is a vast area to make significant research, the researchers uses five sub-dimensions, such as transparency & explainability, fairness & bias mitigation, accountability & human oversight, data privacy & security, and ethical employee awareness, which will give an integrative view of the concept of agility in the industry 5.0 era. The findings of the proposed study offer strategic guidance and actionable insights for SME leaders for the purpose of ethical AI-driven operations, thereby supporting sustainable and resilient growth.

Ethical Ai Climate and Agile Operations

In the fast-changing market conditions, the term agile operations play a crucial role as it senses the unpredictable changes, makes concrete decisions, and reconfigures various operational processes effectively (Kandeel *et al*., 2024) [10]. In the context of SMEs, the need for agile operation is very high when compared to any other field due to many reasons such as very limited slack resources, high uncertainty, and increasing dependence on digital platforms to sustain in the competitiveness (Joshi & Vaidya, 2024) [8]. Nowadays, the implementation of AI in operational process becomes increasing to enhance the speed, accuracy, and immediate responsiveness by considering numerous data (Omowole *et al*., 2024) [15]. At the same time, the ethical side of AI also needs to be considered while implementing this process for the enhancement of productivity (Rajaram & Tinguely, 2024) [17]. The concept "Ethical AI climate" reflects the inner concepts such as transparent, fair, and accountable use in decision-making and operational activities (Kulyk & Zavrazhnyi, 2025) [11]. For the current study researcher take the socio-technical systems theory as it merges both the technological and social sub dimensions together for the enrichment of productivity (Shahzaib *et al*., 2025) [20]. This theory explains that when AI technologies travel along with ethical climate means, employees and leaders are more likely to trust strongly in its outputs without any second mindset into various operational decisions. The output factor "TRUST" reduces hesitation and resistance and accelerates decision execution, which were the key factors of agile operations. Industry 5.0 acts as a human-centric factor that combines technologies with human judgment and mainly incorporates ethical responsibility (Eyeregba *et al*., 2024) [4]. As limited attention has been paid to ethical climate and AI usage, the present research concentrates on how the ethical AI climate influences the agile operations of SMEs through significant trust, reducing cognitive and ethical ambiguity, and impacting flexible operational responses. Based on the review of literature, the following hypothesis has been proposed:

H1: Ethical AI climate has a positive and significant effect on agile operations in SMEs.

As ethical climate encompasses various dimensions such as transparency & explainability, fairness & bias mitigation, accountability & human oversight, data privacy & security, and ethical employee awareness, it fosters a positive environment that directs the employees to strongly believe in the integration of AI recommendations into operational dimensions by enriching responsiveness, adaptability, and overall operational agility in SMEs (Lamrhary & Slaoui, 2025) [12]. Thus

- **H1a:** There is a positive and significant relationship between transparency & explainability of AI and agile operations in SMEs.
- **H1b:** There is a positive and significant relationship between fairness & bias mitigation of AI and agile operations in SMEs.
- **H1c:** There is a positive and significant relationship between accountability & human oversight of AI and agile operations in SMEs.
- **H1d:** There is a positive and significant relationship between data privacy & security of AI and agile operations in SMEs.
- **H1e:** There is a positive and significant relationship between ethical employee awareness of AI and agile operations in SMEs.

After carefully analyzing various past reviews, the researchers came up with a conceptual framework (fig 1) that links the ethical AI climate with agile operations.

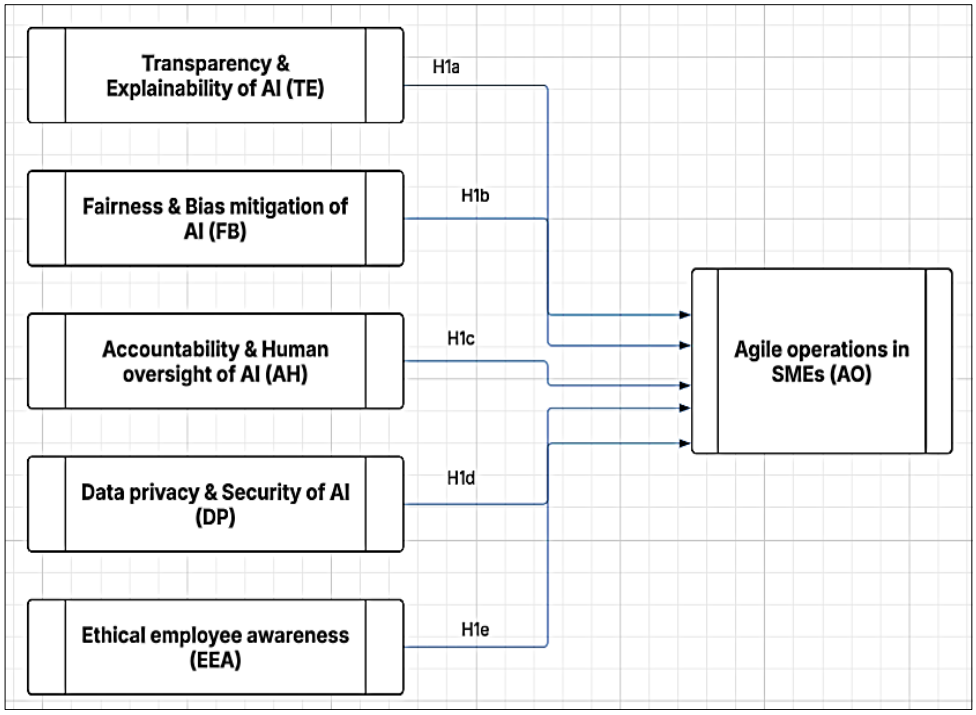

Fig 1: Conceptual Framework of the study variables

Research Methodology

The proposed study is focused on the SME sectors, and data were collected from the state of Tamil Nadu, Coimbatore district. The research study adopted a quantitative and cross-sectional research design to capture the impact of ethical AI climate on agile operations. The primary data collection was done from managerial and supervisory level employees, and the major reason to select this target population is that these people were directly engaging in AI-enabled operational decision making using a framed questionnaire, especially for this study, by interacting with many academic and industrial experts to capture the original context, and were collected through online mode. Each factor consists of five questions. The researcher used a purposive sampling technique to confirm the inclusion of SMEs that adopted the data-driven digital technologies in their industrial operational process. The framed questionnaires followed the five-point Likert scale and were analyzed using SPSS to examine the framed hypothesis by ensuring reliability, convergent validity, and discriminant validity before hypothesis testing. A total of 183 questionnaires were distributed, and 162 questionnaires were returned and found fit for analysis.

Data Analysis: The first step in data analysis is descriptive statistics, Cronbach's alpha value, and correlation analysis, which depicts the primary data analysis to analyze the interrelationship, reliability, and respondents' views of the proposed study variables. The mean values of the descriptive statistics strongly show that the variables come under an ethical AI climate, and agile operations are not positively accepted by the respondents. The Cronbach alpha values show that all the scales are reliable, with the values more than 0.70. The correlation also indicates that there is a positive association between the study variables.

Table 1: Descriptive statistics, Reliability, and Correlation

Variables	Mean	CA	Correlation					
			TE	FB	AH	DP	EEA	AO
TE	2.34	0.799	0.689					
FB	3.01	0.801	0.660	0.701***				
AH	3.46	0.828	0.645	0.677***	0.745***			
DP	2.89	0.799	0.639	0.631***	0.721***	0.762***		
EEA	3.76	0.822	0.578	0.620***	0.633***	0.703***	0.756***	
AO	3.40	0.856	0.536	0.509***	0.599***	0.694***	0.655***	0.801***
***p=0.001								

Structural Equation Modeling

Table 2: Fit Indices of the study variables

Fit Indices	Measurement Model	Standard Values
X^2/df	2.011	≤3.00
CFI	0.901	≥0.90
GFI	0.923	≥0.90
AGFI	0.885	≥0.80
TLI	0.912	≥0.90
RMSEA	0.041	≤0.80

Table 3: Hypothesis Test of the Study Variables

Hypothesis	Effects	Std. Regression Weight	p	Result
H1	TE-AO	0.566	***	Accept
H2	FB-AO	0.489	***	Accept
H3	AH-AO	0.377	***	Accept
H4	DP-AO	0.198	*	Accept
H5	EEA-AO	0.245	*	Accept

*P<0.05, ***P<0.001

By using the AMOS 21 version, confirmatory factor

analysis was executed to test the overall model fit. Table 2 shows the model fit indices values and their cutoff value. The overall fit indices indicate a good model fit. After checking CFA, the structural equation modeling was tested to determine the relationship between the study variables. The standardized path coefficient values are shown in Table 3, which supports the proposed hypothesis of H1a (β=0.566), H1b (β=0.489), H1c (β=0.377), H1d (β=0.198), and H1e (β=0.245), where $p<0.05$ & 0.001. This result has been represented in the framed conceptual framework.

Discussion

The statistical findings of the proposed study give a clear insight and evidence regarding the positive impact of an ethical AI climate on agile operations, which acts as a strategic enabler in SMEs. According to the socio-technical theory, the present result also clearly demonstrates that operational agility is not only driven by different types of technologies, but it is influenced by ethical and human-centric dimensions, which are new and important in the field of operations. The result shows a direct principle that, when employees perceive AI usage in their field as transparent, fair, and accountable, they will adopt it with more value and without any doubts or concerns, which makes decision making and flexible operational responses. The result also aligns with the principle of Industry 5.0, which always focuses on human-centricity along with various technological advancements. The present result guides the SMEs with more clarity, as this type of industry is running in a decentralized methodology, and also the usage of AI reduces the common uncertainty and resistance, thereby enriching the technical activities in a more prominent way. At the same time, the low mean square observed for the study variables suggests that many SMEs in the study area are still in their early stages of adoption of ethical considerations into their AI-related practices. This result acts as an eye-opener to many SME leaders to implement an ethical AI climate in their industries, as it gives more positivity in the field of agility.

Implications for SME leaders

The first implication for the SME leaders is that they should implement the concept of ethical AI as their major performance enhancing mechanisms and should not consider it as a normal regulatory framework. They should keep in mind that technological advancements are growing in a rapid way at the same time, and transparency, accountability, and ethical considerations need to be implemented to develop a sustainable environment and for future perspectives. And by implementing AI climate on the basis of employee training and leadership communication can increase the positive trust in AI systems, which automatically fasten the operational activities. This is the best way to strategize the agility and resilience that is the need of the hour.

Limitations and Future Direction

As the study was conducted in Tamil Nadu, Coimbatore district alone, the result cannot be generalized, and in nearby future, different longitudinal studies in different sectors need to be conducted. And in the future, other factors like predictive technologies, mediating, and moderating factors need to be implemented for new models.

Conclusion

The present study gives a clear outlook that the ethical AI climate is playing a major role in agile operations, particularly in SMEs, within the emerging Industry 5.0 context. This study also demonstrates that the implementation of an ethical AI climate, especially in SMEs of Coimbatore district, is still in an early bud stage, which needs to be considered in a fast tag manner by all leaders and employees. This study gives strong evidence that SMEs should not consider the ethical AI climate as just a regulatory framework, but instead need to be focused on as an operational capability that strengthens human-AI collaboration and operational efficiency.

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