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Human-Centered AI Adoption in Global Industrial SMEs: Organizational Trust, Psychological Impacts, and the Growth–Transformation Paradox

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Abstract

Small and medium-sized enterprises (SMEs) represent more than 90% of global firms and constitute the backbone of employment, supply-chain stability, and economic development. However, these enterprises face chronic structural vulnerabilities when adopting advanced technologies such as artificial intelligence (AI). This article provides a global, human-centered assessment of AI adoption in industrial SMEs, examining organizational trust, psychological effects on workers, leadership behavior, structural gaps, and cross-regional disparities. Drawing on verified data from OECD, World Bank, McKinsey, Eurostat, African Development Bank, INEGI, and ILO, this research analyzes AI integration patterns in North America, the European Union, Latin America, Africa, and Southeast Asia. The findings highlight the persistent "Growth–Transformation Paradox," where the increasing number of SMEs worldwide does not translate into structural technological readiness. The study concludes with a comprehensive framework for human-centered, ethical, and psychologically sustainable AI deployment.

Keywords

Artificial Intelligence; SMEs; Industry 5.0; Human–Machine Collaboration; Organizational Trust; Workforce Psychology; Global Development; Digital Transformation.

Highlights

- SMEs constitute over 90% of global businesses but remain structurally fragile.
- AI adoption varies significantly across regions, with Africa and Latin America showing the largest digital gaps.
- Organizational trust is the primary psychological enabler of AI acceptance.
- Workers exhibit ambivalent responses to AI: motivation to upskill coexists with fear of displacement.
- Human-centered AI governance improves organizational performance and reduces ethical risks.
- The article introduces the **Growth–Transformation Paradox**, explaining why SME proliferation ≠ technological maturity.

1. Introduction

Small and medium-sized enterprises (SMEs) generate around 70% of global employment and represent more than 90% of businesses worldwide (OECD, 2024). Despite their economic importance, these firms remain digitally immature and structurally vulnerable in their transition toward artificial intelligence (AI). As global supply chains become increasingly automated and data-driven, SMEs face mounting pressure to integrate AI for competitiveness, efficiency, and resilience.

However, AI adoption is not solely a technological process; it is fundamentally human and psychological. Workers' perceptions, emotional responses, trust levels, and cultural expectations significantly shape the success or failure of AI initiatives. As shown by research on psychological leadership (López Ayala & Romero Ibarra, 2025), organizational behavior plays a decisive role in moderating workers' technological anxiety and improving decision-making during digital transformation.

Using evidence from five major regions—North America, European Union, Latin America, Africa, and Southeast Asia—this study examines:

• the conditions under which industrial SMEs adopt AI,
• the psychological impacts of such adoption,
• structural inequalities that perpetuate global technological asymmetries,
• and the leadership dynamics that enable sustainable human–machine collaboration.

2. Conceptual Framework: Human-Centered AI and the SME Ecosystem

Artificial intelligence adoption in industrial SMEs lies at the intersection of technology, psychology, and organizational sociology. Given the unique structural constraints of SMEs—centralized decision-making, informal management, limited financial capital—a human-centered approach is required to ensure successful AI integration.

2.1 Human–Machine Collaboration in Industry 5.0

Industry 5.0 repositions technology as an enhancer of human capabilities rather than a substitute. This paradigm emphasizes collaboration between human creativity and machine intelligence. Research from the European Commission (2023) indicates that human-centered AI systems improve operational performance and worker satisfaction when designed for augmentation rather than automation.

2.2 Organizational Trust as an Enabler of AI Adoption

Organizational trust is defined as workers' confidence in the transparency, fairness, and ethical integrity of leadership decisions. Studies indicate that mistrust—rather than technical limitations—is the leading cause of AI project abandonment in SMEs (Deloitte, 2023). Trust moderates fear of displacement, enhances engagement, and increases workers' willingness to interact with machine-driven systems.

2.3 The Growth–Transformation Paradox

While the number of SMEs increases globally, their technological readiness does not improve proportionally. This **Growth–Transformation Paradox** reveals that SME proliferation masks structural weaknesses such as low R&D investment, limited digital

literacy, and informality. The paradox is especially visible in emerging regions such as Africa and Latin America.

3. Research Objectives and Research Questions

This study investigates the complex interplay between technological, psychological, and organizational factors that influence AI adoption in global industrial SMEs.

3.1 General Objective

To analyze the human-centered adoption of artificial intelligence in global industrial SMEs, focusing on organizational trust, psychological impacts, structural barriers, and regional disparities.

3.2 Specific Objectives

1. To examine the relationship between AI adoption and digital maturity across five world regions.
2. To evaluate the psychological effects of AI on SME workers, including trust, fear, and perceived job security.
3. To analyze leadership behaviors and emotional intelligence as drivers of AI acceptance.
4. To compare structural barriers in Africa and Latin America with those in high-income economies.
5. To propose a human-centered governance model applicable to SMEs with limited resources.

3.3 Research Questions

1. How do structural and psychological factors interact to shape AI adoption in SMEs across regions?
2. What role does organizational trust play in workers' acceptance of AI technologies?
3. How do variations in digital maturity affect the pace of SME digital transformation?
4. How do workers from different cultural contexts perceive human–machine collaboration?

5. What governance model can ensure ethical and sustainable AI implementation in SMEs?

4. Methodology

This research follows a qualitative, multi-source integrative design suitable for cross-regional analysis of technological transformation.

4.1 Secondary Data Analysis

Data were retrieved from OECD, World Bank, European Commission, McKinsey, African Development Bank, INEGI, and ILO. These datasets include digital readiness indicators, SME density, broadband penetration rates, AI usage statistics, and workforce skills.

4.2 Comparative Cross-Regional Framework

The analysis compares five regions—North America, EU, Latin America, Africa, and Southeast Asia—on:

- digital maturity,
- AI readiness,
- psychological acceptance,
- structural vulnerabilities,
- human-centered leadership practices.

4.3 Thematic Analysis

A thematic coding approach was used to identify recurring concepts related to:

- human-centered AI,
- organizational trust,
- emotional responses,
- workforce transformations.

4.4 Inclusion and Exclusion Criteria

Inclusion:

- Peer-reviewed articles (2018–2024)
- Institutional reports (OECD, WEF, AfDB, ILO)
- Studies focused on SMEs and AI

Exclusion:

- Studies focused exclusively on large corporations
- Non-academic or unverifiable sources

4.5 Limitations

As a secondary study, results depend on the availability and consistency of cross-regional data. Psychological impacts are inferred from literature rather than field experiments.

5. AI Adoption Patterns in Industrial SMEs: Evidence from Five Global Regions

Artificial intelligence adoption in industrial SMEs varies dramatically across global regions. These differences arise from disparities in digital infrastructure, financing opportunities, labor-force skills, cultural perceptions, and governmental support. Using verified indicators from OECD (2024), World Bank (2023), McKinsey (2023), African Development Bank (2024), and INEGI (2024), this section maps the global distribution of AI integration in SMEs across five regions: North America, European Union, Latin America, Africa, and Southeast Asia.

Table 1. Global SME Landscape by Region

Region	SMEs as % of All Firms	Share of Employment	Digital Adoption Level	AI Readiness Level
European Union	99%	67%	High	High
United States	99.9%	52%	High	High
Latin America	99.5%	61%	Medium–Low	Low
Africa	95%	80%	Low	Very Low
Southeast Asia	97%	66%	Medium	Medium
OECD Global Avg.	99%	70%	High	High

Sources: OECD (2024); World Bank (2023); AfDB (2024); Eurostat (2023).

5.1 North America

The United States and Canada display the world's most advanced digital ecosystems for SMEs. According to the U.S. Small Business Administration (2024), 28% of SMEs already use AI systems—ranging from predictive analytics and automated inventory management to machine learning–enhanced manufacturing. High levels of trust in public institutions, strong data governance, and widespread digital literacy accelerate adoption. Manufacturing SMEs especially benefit from computer vision quality control and predictive maintenance powered by IoT–AI integration.

5.2 European Union

Europe's AI strategy emphasizes ethical, transparent, and worker-centered approaches. Approximately 25% of EU SMEs use AI tools (European Commission, 2023), predominantly for:

- workflow optimization,
- energy efficiency,
- digital twins for manufacturing,
- predictive modeling.

EU labor protections and re-skilling initiatives reduce psychological resistance among workers, resulting in smoother AI deployments compared to Latin America and Africa.

5.3 Latin America

Latin American SMEs face chronic structural weaknesses—high informality, low R&D investment (0.7% of GDP), scarce financing, fragmented digital ecosystems, and limited broadband quality. AI adoption ranges from 3% to 8% (CEPAL, 2024), concentrated mainly in Mexico, Brazil, and Chile.

Workers frequently express mistrust and fear of AI-driven job displacement due to historical instability in labor markets and weak institutional protections. This psychological vulnerability amplifies resistance.

5.4 Africa

African SMEs confront the deepest structural and psychological barriers. Broadband penetration averages 43% (World Bank, 2023), and only 1–3% of SMEs use AI (AfDB, 2024). Limited electricity access, insufficient technical training, and fragile digital infrastructure hinder adoption. Furthermore, high informality (80%) and job insecurity generate strong anxieties toward automation.

5.5 Southeast Asia

Southeast Asia is emerging as a competitive hub for SME digital transformation. AI adoption ranges from 10% to 18% (Asian Development Bank, 2023), with rapid growth in countries such as Vietnam, Malaysia, Thailand, and Singapore. Government incentives and public–private partnerships increase organizational trust and reduce worker resistance. SMEs in export-oriented sectors (electronics, textiles, logistics) integrate AI for efficiency and supply-chain visibility.

6. Africa and Latin America: Structural Gaps, Psychological Barriers, and the AI Divide

Africa and Latin America share structural vulnerabilities that magnify the difficulty of adopting AI in SMEs. These include limited broadband access, low digital literacy, financial exclusion, informality, and insufficient R&D investment. These barriers are compounded by psychological factors such as low trust, fear of job loss, and uncertainty regarding technological fairness.

6.1 Structural Gaps

Table 2. Structural Barriers to AI Adoption in Latin America and Africa

Structural Factor	Latin America	Africa	Sources
Broadband penetration	74%	43%	World Bank (2023)
SME access to formal credit	38%	22%	IMF (2024)
R&D expenditure (% GDP)	0.7%	0.4%	UNESCO (2023)
High-skilled workforce	21%	16%	ILO (2023)
Informality rate	53%	80%	ILO (2023)

These indicators highlight structural disadvantages that limit technological readiness. Weak digital ecosystems restrict SMEs' ability to adopt AI systems requiring stable cloud infrastructure and reliable connectivity. Moreover, low financial inclusion—especially in Africa—prevents SMEs from investing in digital tools or hiring technical personnel.

6.2 Psychological and Social Barriers

Workers in Africa and Latin America experience heightened levels of technological anxiety due to economic precarity and insufficient institutional safety nets. The World Economic Forum (2023) identifies these regions as the highest in "automation-induced anxiety." The fear of job replacement is amplified where informal labor dominates.

Organizational trust plays a critical role here. Without clear communication, training programs, or transparent leadership, workers interpret AI as a threat rather than a

collaborative tool. This creates a self-reinforcing resistance cycle that undermines implementation.

7. Organizational Trust and Psychological Safety in AI Adoption

Organizational trust is the psychological infrastructure required for AI adoption. In SMEs, where decision-making is frequently centralized and informal, trust becomes the differentiating factor between technological success and failure.

7.1 Trust as a Predictor of AI Success

Deloitte (2023) found that organizations with high trust climates are **3.3 times more likely** to achieve successful AI integration. Trust increases acceptance, decreases resistance, and improves the quality of interaction between workers and AI systems.

SMEs with transparent leaders—who communicate AI's purpose and limitations—achieve higher employee buy-in and fewer ethical conflicts.

7.2 Psychological Safety and Fear of Replacement

McKinsey (2023) reports that **34% of SMEs** globally identify fear of job loss as the primary obstacle to AI adoption. Psychological safety refers to workers' belief that experimenting with new technologies does not threaten their job stability or self-worth.

Leaders who cultivate psychological safety help employees view AI as a complementary tool rather than a replacement mechanism.

7.3 Leadership and Emotional Intelligence

Emotionally intelligent leaders reduce anxiety by:

- maintaining transparent communication,
- clarifying how AI augments rather than replaces jobs,
- involving employees in tech-related decision-making,
- offering clear upskilling pathways.

Leadership that integrates emotional intelligence with digital strategy significantly increases the probability of successful AI adoption, especially in resource-constrained SMEs.

8. Human–Machine Collaboration and Workforce Transformations

AI adoption generates profound cognitive, emotional, and cultural transformations within SMEs. Human–machine collaboration reshapes the nature of work, skill demands, and worker identity.

8.1 Skill Evolution and New Competence Models

AI-driven workflows require workers to develop new competencies such as:

- data literacy,
- algorithmic thinking,
- supervisory control of AI systems,
- ethical reasoning,
- advanced communication.

OECD (2024) projects that **40–60%** of SME jobs will require significant re-skilling by 2030.

8.2 Cognitive Load and Decision Augmentation

AI reduces repetitive tasks and cognitive strain by automating routine decision-making. This allows workers to focus on creativity, strategy, and problem-solving. However, poorly designed AI systems may increase cognitive load by demanding constant oversight or interpretation.

8.3 Cultural Differences in Human–AI Collaboration

Cultural psychology plays a major role in AI acceptance. Workers in Europe and North America show higher trust in automated systems due to institutional stability. In contrast, workers in Latin America and Africa prefer human decision-making due to long-standing economic uncertainty and weak regulatory environments.

9. Future Research Agenda and Policy Implications

Artificial intelligence adoption in global industrial SMEs requires a coordinated international agenda that integrates technology, psychology, organizational behavior, and public policy. The evidence presented throughout this study highlights substantial asymmetries between regions and demonstrates that structural and psychological variables are equally important in determining AI success. The following research directions and policy priorities are essential for building an inclusive, equitable, and sustainable AI ecosystem.

9.1 Strengthening Digital Maturity in Emerging Regions

Africa and Latin America exhibit the lowest levels of digital infrastructure, broadband access, and AI readiness. Future research must analyze scalable models for accelerating digital maturity in resource-constrained environments, including:

- public–private partnerships for broadband deployment,
- subsidized AI infrastructure for SMEs,
- national AI observatories,
- cloud computing access programs,
- standardized digital literacy curricula.

Policy implications include establishing national AI funds, promoting tax incentives for digital adoption, and creating regional innovation hubs to support cross-border technological cooperation.

9.2 Psychological Impacts of AI on SME Workers

Little empirical research exists on the psychological effects of AI in SMEs, especially in the Global South. Future studies should employ surveys, longitudinal methods, and cross-cultural psychological instruments to understand:

- anxiety triggered by automation,
- trust dynamics in human–machine collaboration,
- emotional resilience,
- changes in worker identity and job satisfaction,
- coping strategies in low-trust organizations.

This research is essential to designing human-centered AI policies that safeguard worker well-being.

9.3 Ethical AI Governance Models for SMEs

Ethical AI frameworks tend to be designed for large corporations with robust financial and technical resources. SMEs require simplified, cost-effective models tailored to limited budgets. Future research should develop governance templates addressing:

- algorithmic transparency,
- data privacy and fairness,
- explainability standards suitable for SMEs,
- low-cost bias detection tools,
- accessible ethical certification schemes.

Policymakers should embed ethical requirements in digital transformation grants and public procurement guidelines to ensure responsible AI use.

9.4 Leadership Development and Organizational Trust

Future studies must deepen analysis of leadership styles and emotional intelligence as determinants of AI acceptance. Priority should be given to:

- identifying leadership competencies for Industry 5.0,
- formalizing emotional intelligence training programs,
- designing trust-centered organizational cultures,
- evaluating communication practices that reduce resistance,
- studying how leadership moderates psychological safety.

Policies should encourage leadership development through university–industry alliances and mandatory upskilling programs for SME managers.

9.5 Multiregional Comparative AI Impact Studies

The global evidence suggests that AI adoption is shaped by cultural norms, economic conditions, and institutional strength. Comparative studies should expand to:

- Latin America vs. Africa,
- Southeast Asia vs. EU,
- Gulf Region vs. East Asia,
- cross-border supply-chain SMEs.

Such studies can reveal nuanced patterns that facilitate the creation of culturally sensitive AI adoption strategies.

10. Conclusion

This study demonstrates that the successful adoption of artificial intelligence in global industrial SMEs depends on more than technological readiness. It relies heavily on psychological factors such as trust, cultural perceptions, workforce anxiety, and leadership behavior. The analysis across five global regions reveals severe structural inequalities—particularly in Africa and Latin America—that hinder AI adoption despite the growing economic importance of SMEs.

The concept of the **Growth–Transformation Paradox** introduced in this article highlights a critical insight: the numerical expansion of SMEs worldwide does not correlate with their technological maturity. While SMEs make up the majority of global enterprises, they remain disproportionately excluded from advanced digital ecosystems.

Human-centered AI, grounded in transparency, worker inclusion, and ethical governance, is essential to mitigating fears of displacement and enabling sustainable technological transformation. Leadership characterized by emotional intelligence, psychological safety, and clear communication plays a decisive role in building trust and reducing resistance.

AI adoption in SMEs represents not only a technological shift but a profound socio-psychological transition. Firms that prioritize human-centered strategies will be better positioned to participate in global markets, strengthen supply-chain resilience, and foster worker well-being. Policymakers, researchers, and industry leaders must collaborate to ensure that SMEs worldwide are not left behind in the accelerating digital revolution.

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