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BEHAVIORAL ECONOMICS AND INDUSTRY 5.0 ADOPTION IN SMES: A REVIEW OF BOUNDED RATIONALITY, HUMAN-CENTRICITY, AND DECISION BIASES

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Abstract

The adoption of Industry 5.0 reflects a paradigm shift towards human-centric, sustainable, and resilient systems. Small- and medium-sized enterprises (SMEs), while playing a key role in many economies, struggle with exceptional barriers to Industry 5.0 adoption due to the scarcity of resources, limited digital capacities, and cognitive barriers in managerial decision-making. This review studies the network of behavioral economics and Industry 5.0 adoption in SMEs via three research questions: How does the behavioral economics literature explain SMEs' adoption of Industry 5.0 technologies? What roles do bounded rationality and decision biases play in shaping SME decision-making processes related to Industry 5.0 adoption? How does human-centricity in Industry 5.0 help mitigate the effects of bounded rationality and decision biases in SMEs? Considering the recent literature, this review recognizes socioemotional drivers, such as fear of missing out, cognitive biases, such as temporal discounting, optimism bias, and information asymmetry, and organizational challenges as the main determinants of Industry 5.0 adoption in the manufacturing sector. Human-centric features of Industry 5.0 adoption, such as explainable artificial intelligence, participatory design, and experience-based learning, are necessary strategies to control the limitations and biases of decisions. Finally, this review recognizes the gaps in the literature and suggests alternative ways for future research.

Keywords: *Industry 5.0, SMEs, behavioral economics, bounded rationality, decision biases, human-centricity*

1. Introduction

The upgrade from Industry 4.0 to Industry 5.0 (I5.0) creates a fresh formulation in production and manufacturing systems. Industry 4.0 is characterized by the Internet of Things, data exchange, and digitally integrated systems, whereas I5.0 is characterized by a human-centered approach, sustainability, and resilience as its pillars (Linder, 2023). This conversion emphasizes that technological advancements must be aligned with the quality of human life, ecological responsibility, and community priorities. Small and medium-sized enterprises (SMEs) play a major role in the employability and economy of every country. The adoption of Industry 5.0 by SMEs presents both opportunities and challenges.

SMEs perform under bonded rationality, which is higher than that of large firms. Scarcity of financial resources, a limited, talented, and skilled labor force, poor government structures, and organizational barriers to upgrading to the next level are some of the challenges faced (Chigbu, 2025). When upgrading to the next level of SMEs, these organizational constraints are networked with cognitive and behavioral aspects in the process of managerial decision-making. To have a keen idea of how the decision-makers of SMEs observe, assess, and select Industry 5.0 technologies, decision-makers need to go beyond complete rational models of technology adoption and combine them with the perception of behavioral economics. Behavioral economics is all about "*studying how psychological, cognitive, emotional, and social factors influence economic decisions*" (Gartner, 2022).

A high-potential framework provided by behavioral economics for evaluating the decisions of technology adoption. According to Capolupo et al. (2024), SMEs are dragging the decision to convert to Industry 5.0, choosing outdated technologies, or failing to estimate the advantages of the conversion process owing to various factors. These factors include bounded rationality, cognitive biases, SME strategies, and community impacts (Capolupo, 2024). Bounded rationality expresses that when decision-makers are involved in making a decision, they must go through some kind of limitations, such as cognitive limitations, inadequate information availability, and time restraints. This is the case with SMEs, when the focus of the decision-makers is diverted among several procedural requirements, and irregularities in information are noticed among the stakeholders (Davidson, 2024).

Furthermore, Industry 5.0 is accompanied by human-centric approaches capable of revealing paths to picture these behavioral and cognitive challenges in the workplace. Transparency, trust construction, target-oriented decision-making, Artificial Intelligence (AI), collaborative robotics, design participation procedures, and visualization tools (Gupta, 2024) (Linder, 2023). Industry 5.0 initiatives might show the route to reduce the adverse effects of biases and bounded rationality on the outcomes of adoption through technological edges and executional activities with human-centric competencies and limits.

Although there is a high demand for Industry 5.0 adoption in the research domain, less attention has been drawn to the behavioral and cognitive impacts on SMEs' digital transformation decisions. Previous studies have specifically focused on technical readiness and operational capacity, with broad focuses on bounded rationality and decision-making biases. SMEs perform negatively with cognitive and resource constraints, emphasizing behavioral economics as an inevitable concept for a successful Industry 5.0 adoption decision-making. This review is exclusively attempting to find the answer to the following questions:

1. How does the behavioral economics literature explain SMEs' adoption of Industry 5.0 technologies?
2. What roles do bounded rationality and decision biases play in shaping SME decision-making related to Industry 5.0 adoption?
3. How does human-centricity in Industry 5.0 help mitigate the effects of bounded rationality and decision biases in SMEs?

2. Literature Review

Theoretical Foundations: Behavioral Economics and Technology Adoption

The collaboration between behavioral economics and technology adoption can be based on several suitable theoretical aspects. The Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), which are the core of technology acceptance models, highlight perceived usefulness, ease of use, and social influences as key factors in adoption initiatives (Venkatesh, 2003). Although TAM and UTAUT have proven their value in several conditions, they purposefully align with behavioral economics factors, such as rationality, decision process with optimal satisfaction, and emotional, cognitive, and contextual factors.

Extensions of Technology Acceptance Models: Recent studies have enhanced existing acceptance models by incorporating behavioral and emotional factors into them. The socio-emotional theory, Fear of Missing Out (FOMO), which mirrors anxiety as less impactful than its other constructs, specifically pointed out that the intentions of SME decision-makers are all about converting to new production technology, rather than considering the perceived usefulness and ease of use of the new technology (Gartner, 2022). This research outcome underlines that adopting the latest technology-related decisions is not merely influential but also essential. Despite this, it is a step forward in terms of social comparison, competitive gravity, and emotional reactions to ambiguity. Furthermore, the research emphasized that the FOMO effect and emotion-based technological adoption can be controlled by existing well-practiced managers of the same kind of technologies (Gartner, 2022). This moderation effect highlights the importance of learning and complete knowledge of biased decision-making.

Cognitive Bias Frameworks: Capolupo et al. stated that cognitive biases are well identified in entrepreneurial and managerial backgrounds (Capolupo, 2024). By combining different types of biases, such as temporal discounting, optimism bias, and information asymmetry, Davidson et al. formulated a cognitive bias framework specifically for entrepreneurial decisions regarding the adoption of Enterprise Resource Planning (ERP) (Davidson, 2024). This framework offers a matrix to detect when and how biases can alter decisions when choosing and adapting to a technology by SME under bounded rationality (Davidson, 2024).

Afolayan and Harpe surveyed SMEs in South Africa. The study concludes that there is clear evidence that a range of biases analytically alter the entrepreneurial decision-making process of SMEs, and the alteration reflects technology investments (Afolayan, 2019). This study finalizes the different shadows of bias, which influence the crossways of cultural and institutional contexts, proposing that domestic SME ecosystems should find a pathway to cater to behavioral involvement (Afolayan, 2019).

Behavioral Operations Management and Human-AI Interaction: Behavioral operations management enhances behavioral economics principles to a new window, operational decision-making, to explore the impact of cognitive barriers, biases, and heuristics on product planning, inventory management, quality control, and technology implementation in organizations (Linder, 2023). Behavioral operations viewpoints underline human-AI interface designs, explainable AI (XAI) systems, and collaborative robotic platforms that include human cognitive barriers while uplifting the computational capacities of Industry 5.0 (Linder, 2023); (Gupta, 2024).

XAI is an expert in presenting the tricky issue of machine learning models, "black box," with the help of clear interpretations of digitized decisions. This can control the irregularity of information, create user trust, and stand for a more purposeful estimation of AI-generated references (Gupta, 2024). XAI systems may frustrate biases, such as overconfidence and robotic bias, by ensuring prominence and coherent step procedural reasoning (Ikbal, 2025).

Digital Readiness and Capability Models: Digital readiness, absorptive capacity, and governance structure explain the operational behavioral elements that function within an organizational framework. Chigbu and Makapela used the digital maturity and technology readiness framework to evaluate the preparation for Industry 5.0 adoption using the constructs of financial resources, superior management support, and skill availability (Chigbu, 2025). These organizational factors are related to managerial cognition. Limited resources may intensify the dependency on heuristics and short-term thinking, whereas superior manager support may afford a relaxed organizational atmosphere for managers to ensure premeditated decision-making (Chigbu, 2025).

Hsu et al. extended their research to the field of supply chains in developing nations, presenting that constructs such as governance, finance accessibility, and collective networks alter the association between managerial intents and definite Industry 5.0 dissemination (Hsu, 2024). Their model explained that even if the organization's behavioral intention is positive for adoption, if organizational and external environmental limitations lead to a step back in the implementation process, it emphasizes the necessity of a behavioral and capability perspective as a combined model (Hsu, 2024).

Behavioral Economics Explanations for SME Adoption of Industry 5.0 Technologies

The review of the existing literature on behavioral economy provided a handful of evidence that Industry 5.0 technology adoption of SME can be figured out with the psychological, emotional, and cognitive factors. Evidence is provided at the individual, organizational, and interorganizational levels.

Social-Emotional Drivers: Fear of Missing Out: In SMEs' aim to adopt, FOMO is a substantial forecaster. Gartner et al. used 514 SME decision-makers from Austria in their experiment. They concluded that FOMO positively forecasts the purpose of the latest manufacturing technology adoption to control the TAM variables (Gartner, 2022). The outcome of this research was quite firm among managers, who have lower

existing experience with the same kind of technologies, commenting that FOMO performs as an experimental alternative for methodological assessment at the point when decision-makers have limited knowledge of similar fields (Gartner, 2022).

The FOMO mechanism replicates imaginary competition and in-depth social comparisons. Managers of SMEs view technological adoption as an opportunity in industries where rapid technological change occurs, and competitive firms are also converting to the latest technology, even though they do not have a clear understanding of the advantages of conversion. These socioemotional factors can drive through the least standard adoption conclusions, especially when firms do not possess the required resources and competencies to adopt them (Gartner, 2022).

Despite this, the SME managers' wealth of experience interrupts socioemotional decisions. When managers gain thorough knowledge through pilot projects, demos, training, and/or prior experiences, FOMO-based and deliberative adoption decisions are controlled to some extent (Gartner, 2022). The author concludes that managers' practical experience and understanding of adaptation can lead to systematic decision-making over emotion-based decision-making.

Information Asymmetry and Vendor Relationships: Due to a lack of required information availability among SME stakeholders, an organizational disorder is created that intensifies cognitive biases and misleads decision-making. As Davidson et al. (2024) stated, merchants' existing thorough understanding of technology and systematic motivations turned into benefits, although modulating challenges established a condition in which SME managers, who are the decision-makers, are vulnerable to a higher level of bias and overconfidence (Davidson, 2024). To reach progressive discounts and/or accessible heuristics, merchants may need to restructure their technology (Davidson, 2024).

Poor information availability is not a stand-alone problem in SMEs; however, it is exacerbated by the restricted capacity for sovereign technical valuation. SMEs cannot compare themselves with large companies that have established a separate department for Information Technology (IT) and external counsellors. In contrast, SMEs habitually depend on the information provided by vendors and the references of their peers, both of which are biased (Davidson, 2024). Depending on external information, factors intensify the risk of choosing inappropriate technology, especially for complex systems such as enterprise resource planning (ERP) platforms, AI-driven analytics, and collaborative robotics.

Organizational Enablers and Constraints: Behavioral drivers intersect with organizational factors, which help and/or hinder the decision to implement a technology. Providing Industry 5.0 features to the supply chain of SMEs is decided mainly by top management support, organizational governance structures, financial availability, and a skilled workforce (Hsu, 2024). Although top management support is crucial for adoption, it is like a nightmare to obtain, since it means a green flag for organizational promise to support, by providing the needed resources and offering legal approval for the change initiative, with required modifications to its daily routines (Hsu, 2024). In contrast, limited resources demotivate technological adoption by defusing organizational support for the necessary experimentation, learning, and recovery from initiative failures. Where financial and human resources are scarce in organizations, this creates challenges for managers in giving preference to short-term organizational requirements over long-term sustainable reserves, intensifying progressive discounts and risk distaste (Chigbu, 2025). This leads to pressure on decision-making regarding sustainable reserves, such as digital transformation and instant and short-term survival.

Trust, Transparency, and Technology Design: XAI, spontaneous interfaces, and human-robot combined work processes can increase trust and decrease psychological disruptions to adapt to technology, as the state of human-centric factors in Industry 5.0 (Linder, 2023) (Gupta, 2024). Trust acts as a major moderator between technological capacity and adoption decision-making processes. This confirms the major role of the human factor in conducting a major shift in operations, which requires acceptance to give control to autonomous systems (Gupta, 2024).

Gupta and Gupta suggested a cross-cultural model to support decision makers, considering humans with AI, which stabilizes algorithmic intellect with human concern, accentuating the need for understandability, user control, and transparency when establishing trust among decision-makers (Gupta, 2024). If the AI-driven system is built with the feature of submitting a detailed justification of its decision, the user can critically analyze the reference of the system, recognize possible errors that were left by the system, and combine algorithmic perceptions with related information (Gupta, 2024). These procedures will lead to AI adoption in SMEs while keeping the "black box" concept aside.

Likewise, a human and AI collective system creates a safer environment; its use diminishes anxiety and confrontation through protective human activities and error correction (Hsu, 2024). Furthermore, it can diminish the objection to adoption by ensuring the coordination of employees in an automatic process, rather than replacing humans with technology, and involving employees in safety-based execution processes (Hsu, 2024).

Analytics and Evidence-Based Decision Cultures: AI-based systems provide another behavioral benefit for upgrading decisions regarding the adoption of such systems. Ikbal (2025) conducted a meta-analysis of AI-based analytics in the SME context and discovered that such instruments help expand sustainable strategic decision-making by offering information-based planning for that particular situation, controlling overconfidence, and uplift-proof-based valuation of technological investments (Ikbal, 2025). Nevertheless, these advantages depend on the firm's ability to identify, integrate, and use external knowledge, and the organizational structure that boosts data quality and analytical consistency (Ikbal, 2025).

If either SMEs' forecasting capability or analytical instruments are less integrated with the decision-making process, the expected advantages may not be achieved. In some other circumstances, analytical decisions may also be biased when the decision-maker is handling confirmation bias, selectively reaching the information that supports their thoughts, or automation biases, when excessively depending on algorithmic output without considering critical analysis (Ikbal, 2025).

Bounded Rationality and Decision Biases in SME Decision-Making

Bounded rationality is the locus point for understanding technology adoption in this study. This section includes the manifestation of bounded rationality and decision biases in the context of Industry 5.0 adoption.

Manifestations of Bounded Rationality in SMEs: The manifestation of bounded rationality in SMEs can be revealed through several interconnected mechanisms. SME managers naturally give more consideration to supervising several functional departments simultaneously and give less priority to detailed technological evaluation. This separation of levels of devotion upgrades heuristic dependency, leading to systematic errors (Davidson, 2024).

Furthermore, SMEs are always stuck with poor information on complete market awareness, technical provisions, and crucial data that are required for technology selection. The information scarcity of SMEs is a critical challenge when converting to the latest trendy technologies, such as AI, collaborative robotics, and IoT platforms, where new standards and best practices are revealed daily (Chigbu, 2025). Moreover, SME managers frequently face challenges in timely problem-solving processes because of their limited resources and a fast-paced environment. This time limitation downplays planning and evaluation but focuses on quick, institution-based decision-making (Afolayan, 2019). Additionally, in contrast to large enterprises, SMEs have limited capacity to bear failures during implementation. This limited slack intensifies the risk and instant decision-making, making managers hesitant to invest in technology with doubtful and time-consuming returns (Chigbu, 2025).

Specific Decision Biases; Temporal discounting refers to the preference for smaller, short-term benefits over larger, long-term benefits. In terms of technology adoption, this bias demonstrates a desire for low-

cost instant implementation results that present quick earnings, but may lose their long-term strategic fit (Davidson, 2024).

Davidson et at. (2024) mentioned in their research the effect of temporal discounting on ERP adoption. He added that SME managers, as decision-makers, focus on cost and implementation speed when choosing a system rather than sustainable proprietorship, scalability, or combination capability (Davidson, 2024). Furthermore, he stated that this short-term planning can lead to repeated costs and system replacement costs according to the growth of the business, where integration becomes inevitable (Davidson, 2024).

As Industry 5.0 focuses on long-term investment in infrastructure, training, and process design, while gradually gaining benefits over time, temporal discounting will be challenging. Although the long-term benefits are favorable for SMEs, they may struggle to validate such reserves because of sudden financial pressures (Chigbu, 2025).

Table 1: Cognitive Biases Affecting Industry 5.0 Adoption in SMEs

Cognitive Bias	Description	Impact on SME Technology Adoption
Fear of Missing Out (FOMO)	Anxiety about falling behind competitors	Encourages reactive technology adoption
Temporal Discounting	Preference for Short-term gains	Reduces long-term strategic investments
Optimism Bias	Underestimation of risks	Leads to unrealistic implementation expectations
Information Asymmetry	Unequal access to information	Increase dependence on vendors
Overconfidence	Excessive confidence in managerial judgment	Reduces external consultation and critical evaluation
Automation Bias	Excessive trust in AI outputs	Weakens independent managerial assessment
Anxiety and Resistance	Fear of job loss or technological uncertainty	Creates resistance to Industry 5.0 adoption

Optimism bias is the concept of underestimating risks and overestimating advantages, and is frequently discussed in the entrepreneurial field (Capolupo, 2024). This will drive decision-makers to underestimate the implementation risks, training needs, difficulties in integration, and possible distractions to the process (Davidson, 2024).

Davidson et al. (2024) observed that optimism bias is the major reason for ineffective planning of ERP implementation, because decision-makers fail to assign the required time, budget, or human resources for change management and the user training process (Davidson, 2024). This ineffective planning paves the way for unbearable failures and higher expenses than those allocated to the technological projects (Davidson, 2024). This optimism bias is frequently pronounced in SMEs because the entrepreneur is well aware of the opportunities he can gain and the risks he must face in the future. This awareness is indeed for innovation, as it can drive the achievement of unreachable milestones in technology adoption (Capolupo, 2024).

Information asymmetry among SME stakeholders can lead to biased decision-making. Merchants focus on stabilizing product strengths, reducing limitations, and finding selections to favor their contributions (Davidson, 2024). As SME decision-makers suffer due to a lack of independent expertise, there are more possibilities for failure in evaluating the hidden costs and risks. This information asymmetry is worsened by the complexity of Industry 5.0 technologies, which frequently involve specialization in AI knowledge, robotics, IoT, and data analytics. SMEs may have limited absorptive capability to value technical specifications, interoperability necessities, or cybersecurity implications, and then become vulnerable to optimal vendor collection (Chigbu, 2025).

Overconfidence can decrease the preference for obtaining external advice, performing systematic assessments, or using decision support instruments (Ikbal, 2025). In SMEs, overconfidence can arise from existing experience, expert availability, and support for fundamental operations or entrepreneurial perceived competence (Capolupo, 2024). According to Ikbal (2025), the efficacy of AI-driven analytics of SMEs can be bound by overconfidence, as it drives managers to neglect data-based endorsements and struggle with firms (Ikbal, 2025). This neglect denotes an optimal circumstance that missed the opportunity to enhance computational capabilities for scenario planning and risk valuation (Ikbal, 2025).

Anxiety about job dislocation, missing control, and unfamiliarity with technology are key psychological barriers to AI and automation adoption (Block, 2024). Block (2024) expresses psychological barriers to AI adoption in SMEs and points to anxiety as the key barrier among employees and middle-level managers who see AI as a challenge to their roles (Block, 2024). However, if AI systems are implemented, there is a possibility of excessive reliance on them by the users (Block, 2024). This excessive reliance creates bias, as it drives through when an incorrect algorithmic recommendation is followed or when all the required information is not captured by the system to make a decision (Ikbal, 2025).

Usually, decision biases are not stand-alone; instead, they depend on each other. Poor information disbursement intensifies optimism bias while controlling the decision-makers' understanding of risks, and time limitation magnifies dependence on heuristics such as accessibility and representativeness (Capolupo, 2024) (Davidson, 2024). Capolupo et al. (2024) experimented with SMEs in Italy and the Czech Republic to indicate bias, documenting that several biases alter entrepreneurial decisions simultaneously, with the impacts differing by decision framework and cultural background (Capolupo, 2024). This complication underlines the need for multilayered interventions that simultaneously address multiple biases (Capolupo, 2024).

Human-Centricity as a Mitigation Strategy

Industry 5.0 approaches, accompanied by human-centricity, ensure the moderation of the impact of bounded rationality and decision biases in SMEs. This section discusses the evidence of explainable AI (XAI), training interventions, and experience-based learning.

Explainable AI and Transparency: XAI systems offer an understandable interpretation of algorithmic decisions, revealing the "black box" problem as helpful in reducing suspicion and resistance to change (Linder, 2023) (Gupta, 2024). By providing proper reasoning for AI decisions, XAI mitigates information misinterpretation, provides a critical evaluation of recommendations, and constructs user confidence in AI systems (Gupta, 2024).

Gupta and Gupta (2024) claim that if top managers and, decision-makers, are not experts in the AI context and do not trust adoption, the role of XAI in the SME context is threatened (Gupta, 2024). If SME managers have a clear understanding of each AI process, they can determine the significance of that process, identify the errors left by the system, and combine mathematical algorithmic intuitions with their background knowledge (Gupta, 2024). Moreover, if users have a clear understanding of AI decisions, they can draw a mental model to illustrate the system behavior, develop forecasting capabilities based on the findings, and identify errors in algorithmic recommendations (Linder, 2023). These learning habits can diminish excessive dependence on AI decisions by developing critical involvement with AI output (Block, 2024).

Nevertheless, the acceptance of XAI is determined by the quality of explanations and user characteristics. Explanations should be constructed considering the technical literacy of the user, decision context, and information requirements (Gupta, 2024). More technologically biased explanations may confuse non-technology users, while more simplified explanations may fail to convey the original weight of decisions (Linder, 2023).

Participatory Design and Collaborative Human-Robot Systems: Participatory design is a method of ensuring the involvement of all users of the system, lower-level employees, managers, and other stakeholders in the design and development of Industry 5.0 technologies (Hsu, 2024). This method ensures a way of ensuring the well balance between technological capacity, organizational requirements, fostering buy-in, and decreasing resistance to change (Hsu, 2024).

Furthermore, Hsu et al. (2024) highlighted the reputation of human-robot combined system design for safe, in-built connection (Hsu, 2024). When users have a clear understanding of AI as an assistant for human work procedures rather than a replacement for human jobs, they also prefer to accept AI (Hsu, 2024). Participatory design is highly recommended to create this perception in users by accommodating their preferences, workflows, and safety concerns. Sangarathan and Shanmugathas (2005) document an experimental study in Sri Lanka on human-centric transformation in family-owned SMEs, proposing how participatory approaches are helpful in equalizing technological changes with organizational culture, family orientation, and intergenerational concerns (Sangarathas, 2025). Their study emphasizes the importance of a participatory approach for stakeholders in technology adoption decisions to confirm the line and address stakeholders' concerns (Sangarathas, 2025). Moreover, participatory design can reduce optimism bias and overconfidence by combining multiple perspectives and developing possible implementation trails in the early stages of adoption (Sangarathas, 2025). Additionally, top managers can observe practical compilations, training requirements, and workflow interruptions as employees and middle-level managers collaborate on participatory activities (Hsu, 2024).

Cognitive Bias Awareness and Training Tools: Well-planned training tools to measure progressive awareness of cognitive biases can motivate purpose-oriented decision-making. The cognitive bias awareness matrix for ERP adoption, developed by Davidson et al., reminds decision-makers to deliberate on how temporal discounting, optimism bias, and information asymmetry alter their appraisals. The matrix motivates managers to find further information, access external experts, and consider long-term objectives in their analytics by explicitly revealing their bias (Davidson, 2024). Furthermore, training is the best mechanism to give a thorough knowledge to SME managers on common biases and their reflections on technology adoption decisions, which denotes another interference approach. These trainings can be coupled with case studies of failed adoptions, replications to reveal bias effects, and a decision support framework to frame the evaluation process (Davidson, 2024).

Despite this, efficiency is not dependent on awareness and training. Behavioral economics-based research indicates that simply updating individuals regarding biases does not always lead to a change in behavior, especially when biases are deep-rooted or situational burdens remain (Afolayan, 2019). Long-term interventions that raise awareness of organizational changes may be more effective in achieving these goals (Davidson, 2024).

Experience-Based Learning and Pilot Projects: Experiment-based learning has emerged as a powerful option for mitigating emotion-driven biases and supporting systematic evaluations (Gartner, 2022). Gartner et al. (2022) further added that existing experiences in the same kind of technology alter the FOMO impact, as experienced managers show lower socioemotional adoption burdens and more purposeful decision processes. Initial pilot projects also provide additional benefits to the stakeholders. They allow SMEs to assess technologies in a bounded environment, combined with limited risk, providing a suitable opportunity to assess, identify barriers during implementation, and build internal strategies before a full-scale implementation (Gartner, 2022). A pilot project is also a better way to gain experimental knowledge, which can inform subsequent decisions, minimizing reliance on merchant claims and peer references (Chigbu, 2025).

Additionally, pilot studies serve as learning platforms for increasing firms' ability to identify, incorporate, and apply external knowledge to their products (Ikbal, 2025). Employees of SMEs have a great opportunity to gain experience with Industry 5.0 technology; they can use that to improve their technical skills, build

confidence, and increase their problem-solving capacity, which will help them implement it effectively (Chigbu, 2025).

AI-Driven Analytics and Decision Support: AI-driven analytics on SMEs can boost the decision-making process while delivering data-driven scenario planning, criteria, and a risk assessment matrix for SMEs (Ikbal, 2025). Ikbal (2025) further states that analytical instruments can decrease overconfidence by opposing managers with objective indications that raise questions about their conventions and leave space for observing uncertainties and risks.

However, the advantages of analytics depend on organizational factors such as accurate data governance, analytical skills, and managerial acceptance of adapting analytics results (Ikbal, 2025). If the organization lacks these competencies, analytical tools may be inadequately utilized, misconstrued, or purposefully used to emphasize a positive impact rather than to challenge biases (Ikbal, 2025). Gupta and Gupta suggested a human-AI balanced decision support model that combines algorithmic intelligence with human insights, highlighting the requirement for explainability, user control, and iterative response (Gupta, 2024). In this proposed model, the AI system delivers recommendations and justifies its recommendations, whereas human decision-makers hold the final authority and accountability, and algorithmic perceptions with background knowledge and ethical concerns (Gupta, 2024).

3. Methodology

Research Design

A narrative literature review method was used to investigate the relationship between behavioral economics and Industry 5.0 adoption in SMEs. This method was found to be the most suitable owing to the aims of the study and the conceptual, theoretical, and empirical significance from various perspectives, such as behavioral economics, technology adoption, and Industry 5.0. This review is expected to provide a clear understanding of how bounded rationality, cognitive biases, and human-centric approaches impact the SME decision-making process in the era of Industry 5.0. The study was conducted to answer the research questions.

Search Strategy

Compatible literature was collected from academic databases like Scopus, Web of Science, and Google Scholar. Searching was performed using a combination of keywords and Boolean operators to identify relevant studies. The keywords included “Industry 5.0”, “SMEs”, “small and medium enterprises”, “behavioral economics”, “bounded rationality”, “cognitive bias”, “technology adoption”, “human-centricity”, “AI adoption”, “explainable AI”, “decision-making”, and “digital transformation”. Various combinations of these keywords were used in the databases to obtain the prior studies related to the research domain.

Table 2: Summary of Reviewed Studies on Behavioral Economics and Industry 5.0 Adoption in SMEs

Authors	Focus	Key Concepts	Main Findings
Cartner et al. (2002)	SME technology adoption	FOMO	Fear of missing out positively influenced adoption intentions
Davidson et al. (2024)	ERP adoption in SMEs	Cognitive bias	Temporal discounting and optimism bias affected decisions
Gupta & Gupta (2024)	Human-AI decision support	Explainable AI	Transparency improved trust and adoption
Hsu et al. (2024)	Supply chain in SMEs	Industry 5.0 enablers	Governance and finance influenced diffusion
Ikbal (2025)	AI analytics in SMEs	Decision support	AI analytics improved strategic decisions
Chigbu & Makapela (2025)	SME digital readiness	Technology readiness	Resource constraints intensified bounded rationality

Furthermore, the selection was narrowed to publications between 2019 and 2025. Some foundational studies and classical theories also underwent review due to their conceptual validity. Moreover, it focused on the peer-reviewed journal articles, conference proceedings, and scholarly review papers written in English that are relevant to SMEs and digital transformation. However, literature focusing on large enterprises, discussing Industry 4.0 or prior versions, non-academic or non-peer-reviewed sources, and unrelated concepts to the theme were excluded from the review.

The final articles were screened using titles, abstracts, and keywords to ensure compatibility with the research topic. Duplicated articles were removed, and the remaining final sets of articles were reviewed.

4. Discussion and Implications

Theoretical Contributions

This review enhances the understanding of SMEs' technology adoption from a behavioral economic perspective using the concept of Industry 5.0. Meanwhile, previous technology adoption theories, TAM and UTAUT, underlined perceived usefulness, ease of use, and social influence. However, the outcomes of this narrative review emphasize that SMEs' Industry 5.0 adoption cannot be completely revealed using a rational evaluation model (Venkatesh, 2003). The articles reviewed here summarize that emotional, cognitive, and contextual factors strongly control SMEs' managerial decision-making processes.

The literature review validates that behavioral economics concepts moderate farmers' adoption decisions. The decision-maker of an SME operates under the pressures of bounded rationality, such as resource scarcity, poor information availability, time constraints, and limited access to technical expertise. This situation amplifies the emotional drivers (FOMO) and cognitive bias (temporal discounting and optimism bias), and performs together with traditional acceptance model variables (perceived usefulness and ease of use) (Davidson, 2024) (Gartner, 2022). This combination strengthens the technology acceptance theory while acknowledging the complexities of human-centric decision-making.

Furthermore, the review underlines information constraints, separated managerial consideration, and small organizational slack, which intensifies the possessions of bounded rationality in the SME context. This context sensitivity emphasizes the adoption theory requirements for heterogeneous types of organizations rather than a homogeneous decision process over different-sized firms. Finally, the role of human-centricity as a pillar of Industry 5.0 was reframed by considering both ethical imperatives and behavioral interventions, which can moderate cognitive biases and substantiate more purpose-centric decision-making processes. This reframes the links between psychological and behavioral findings with technological design, opening a new research direction.

Practical Implications

The review proposes several actionable insights for SME managers and decision-makers, such as prioritizing experiential learning, adopting structured decision-making tools, demanding transparency from vendors, investing in absorptive capacity, and holding participatory design. Adoption of Industry 5.0 in SME is a combined work with financial, technical, behavioral, and cognitive factors.

The literature prioritizing experiential learning to provide experience as a moderator on emotion-driven biases, before committing to a full-stuck adoption process. SMEs should conduct pilot projects with trials and training that provide a handful of experiences on Industry 5.0 technologies first, and then expand gradually for complete development. Policymakers can initiate these projects through funded pilot projects, technology demonstrations, and peer learning grids. This test-driven approach may help in controlling the unanticipated threats.

Another specific identification is the human-centric Industry 5.0 implementation in SMEs. This review recommends that ensuring employee trust and reducing resistance to change with AI-driven adoption can

be balanced with XAI, pilot projects, and human-AI collaboration. The review findings are crucial for policymakers and institutional stakeholders. Stakeholders, such as governments, industry associations, and development boards, support SMEs in several ways. Policy makers' understanding may assist in mitigating bounded rationality and information asymmetry during SMEs' decision adoption.

Finally, the review ensures that SMEs with internal learning and analytical competencies are more positive in managing the complications of cognitive biases and are well-standardized to achieve long-term digital transformation benefits.

Limitations and Future Research Directions

Most studies on human-centric justification are theoretical or based on observational data. However, there is a limitation to controlled experiments that assess whether explainability, participatory design, and training considerably decrease bias in SMEs. Furthermore, most experimental studies are cross-sectional and provide clear pictures of adoption decisions. Hence, long-term designs and research to trace SMEs' technological adoptions from the initial stages to the final phase, focusing on sustainable benefits, are needed. This review uses existing studies conducted in specific countries and industries. Furthermore, it can be expanded to different sizes of SMEs, sectors, and countries to generalize the findings.

5. Conclusion

Converting to Industry 5.0 opens several doors to increasing the competitiveness, sustainability, resilience, and effective operational performance of SMEs. However, this leads to challenges with limited resources and cognitive limitations. This review illustrates that the adoption of Industry 5.0 in SMEs will not be effective alone. While finding answers for three research questions, the behavioral root cause of adoption, the role of bounded rationality and decision biases, and the necessity of human-centric implementation to control cognitive limitations, the findings show that behavioral economics plays a major role in SME technology adoption process decisions, with uncertainty, limited resources, and poor information. Furthermore, this review concludes that bounded rationality and cognitive biases steadily control the SME decision-makers in Industry 5.0 implementation.

The study shows that the industry 5.0 adoption decision of SMEs is designed by socioemotional drivers, like FOMO; cognitive biases, such as procedural discounting, optimism bias, information asymmetry, overconfidence, and anxiety; and organizational constraints, such as limited resources, information scarcity, and time constraints. These factors are discussed more in SMEs, such as poor technical experts, financial limitations, time constraints, and dependence on external information. are networked to deliver the adoption pattern.

Another key identification of this review is that human-centric features of Industry 5.0, which modify bounded rationality, such as XAI, participatory design, collaborative robotics, cognitive biases, and experimental learning involvement, produce a perfect strategy for discussing these behavioral challenges. These methods can support SMEs in overcoming the challenges of Industry 5.0 adoption while ensuring transparency, building trust, involving stakeholders, and guiding them toward purposeful decision-making.

Overall, this review highlights the need for the expansion of technology adoption theories combined with behavioral economic practices in Industry 5.0 research. This collaboration will lead to the effective digital adoption of SMEs. Future research should focus on integrated concepts with technological capabilities, organizational readiness, and human-centric behavioral approaches in SMEs and other industries. This combination reveals a new path towards sustainable, inclusive, and effective SME transformation.

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