Moroccan SMEs in the Age of AI: Towards Innovative and Ethical Management

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Abstract—**This research analyzes the role of Artificial Intelligence (AI) in transforming managerial capabilities and enhancing responsible entrepreneurship performance within Moroccan Small and Medium-sized Enterprises (SMEs). By mobilizing dynamic capabilities theory, the TOE framework, diffusion of innovation theory, and self-determination theory, the study examines how AI adoption serves as both a technical and strategic lever. A quantitative survey conducted among 263 SME managers operating across various sectors was analyzed using Structural Equation Modeling (SEM) to test six hypotheses. The findings indicate that AI adoption significantly contributes to the development of responsible managerial capabilities and exerts a direct positive effect on responsible entrepreneurship performance. Moreover, managerial capabilities play a partial mediating role, while organizational support, sectoral digital intensity, and decision-making autonomy positively moderate these relationships. These results highlight the potential of AI as a "leveling factor" for SMEs in emerging economies, fostering more inclusive and sustainable entrepreneurship. The study makes a theoretical contribution by expanding the dynamic capabilities perspective and provides practical recommendations for managers and policymakers to support an ethical, agile, and responsible digital transformation of SMEs.**

Keywords—**Artificial Intelligence; Responsible Entrepreneurship; Managerial Capabilities; Small and Medium-sized Enterprises (SMEs); Morocco**

I. INTRODUCTION

Since the beginning of the 21st century, digitalization and artificial intelligence (AI) have become central drivers of economic transformation, reshaping decision- making processes, resource utilization, and innovation dynamics [14][11]. AI is no longer limited to the automation of repetitive tasks ; it has increasingly emerged as a strategic lever for value creation, resource optimization, and responsible innovation, profoundly influencing the economic, social, and organizational dimensions of firms. While developed economies have rapidly integrated AI, Morocco faces both opportunities and challenges : AI can help level the playing field for SMEs [11][7], yet barriers such as weak infrastructure, financing constraints, and skills shortages continue to limit its adoption [26][15]. These structural constraints hinder the effective diffusion of AI and exacerbate disparities between large firms and SMEs, particularly in emerging economies.

The successive digital strategies—Maroc Numeric 2013, Maroc Digital 2020, and Maroc Digital 2025—implemented within the framework of the New Development Model, aim to promote inclusive digitalization and reduce inequalities. These orientations reflect public authorities' commitment to positioning Morocco as a regional hub for technological innovation, sustainability, and social inclusion, while modernizing the national productive fabric. In this context, SMEs —accounting for more than 90% of the national economic fabric— represent key actors. They constitute a particularly relevant setting for analysing the impact of AI, given their organizational flexibility as well as their vulnerability to rapid technological change.

Accordingly, this study examines how AI adoption contributes to the development of managerial capabilities and the promotion of responsible entrepreneurship, drawing on the dynamic capabilities approach [33][34], the TOE framework [30], diffusion of innovation theory [30], and self-determination theory [13]. However, the existing literature remains largely focused on the technological or financial performance outcomes of AI, often overlooking its effects on responsible managerial capabilities, as well as the organizational and cognitive mechanisms underlying responsible entrepreneurship, particularly within SMEs in developing economies.

Therefore, a central research question arises: to what extent does the adoption of artificial intelligence by Moroccan SMEs contribute to the development of responsible managerial capabilities and, consequently, to the improvement of their responsible entrepreneurship performance, within a context characterized by structural and institutional constraints?

II. REVIEW AND HYPOTHESES DEVELOPMENT

Artificial Intelligence (AI) is reshaping entrepreneurial ecosystems by transforming managerial practices, decision-making, and value creation [11][5][8]. Beyond automation, it drives strategic innovation through predictive analytics that help entrepreneurs anticipate change and design new business models [14][20]. As an "external enabler" [12], AI creates opportunities for SMEs [34] and redefines opportunity recognition [31], blending big data with human intuition to produce the "augmented entrepreneur" [32]. Managerial capabilities now extend to ethical leadership [18], agility [22], stakeholder inclusion [29], and sustainability [1][2]. Theoretical frameworks such as the Dynamic Capabilities View [34][19][24][33], TOE [30], and Self-Determination Theory [13] highlight AI's role, moderated by organizational and environmental factors [7][15]. In Morocco, AI reduces entry barriers but faces challenges [26], prompting six hypotheses on its direct, mediating, and moderating effects on responsible entrepreneurship performance.

Based on this literature review, it is possible to derive a set of research hypotheses to empirically test the identified relationships:

- H1: The adoption of AI by Moroccan startups is positively associated with the development of responsible managerial capabilities among their leaders.
- H2: AI adoption has a direct positive effect on responsible entrepreneurship performance in Moroccan startups.
- H3: Responsible managerial capabilities mediate the relationship between AI adoption and responsible entrepreneurship performance.
- H4: The relationship between AI adoption and the development of responsible managerial capabilities is positively moderated by the level of organizational support (top management support).
- H5: The relationship between AI adoption and responsible entrepreneurship performance is stronger in startups operating in highly digitalized sectors than in those in low digital-intensity sectors.

- H6: The decision-making autonomy of the leader positively moderates the effect of AI adoption on the development of responsible managerial capabilities.

Building on hypotheses H1 to H6, we propose the following conceptual model, which illustrates the direct relationships between AI adoption, the development of responsible managerial capabilities, and responsible entrepreneurship performance, as well as the identified mediating and moderating effects
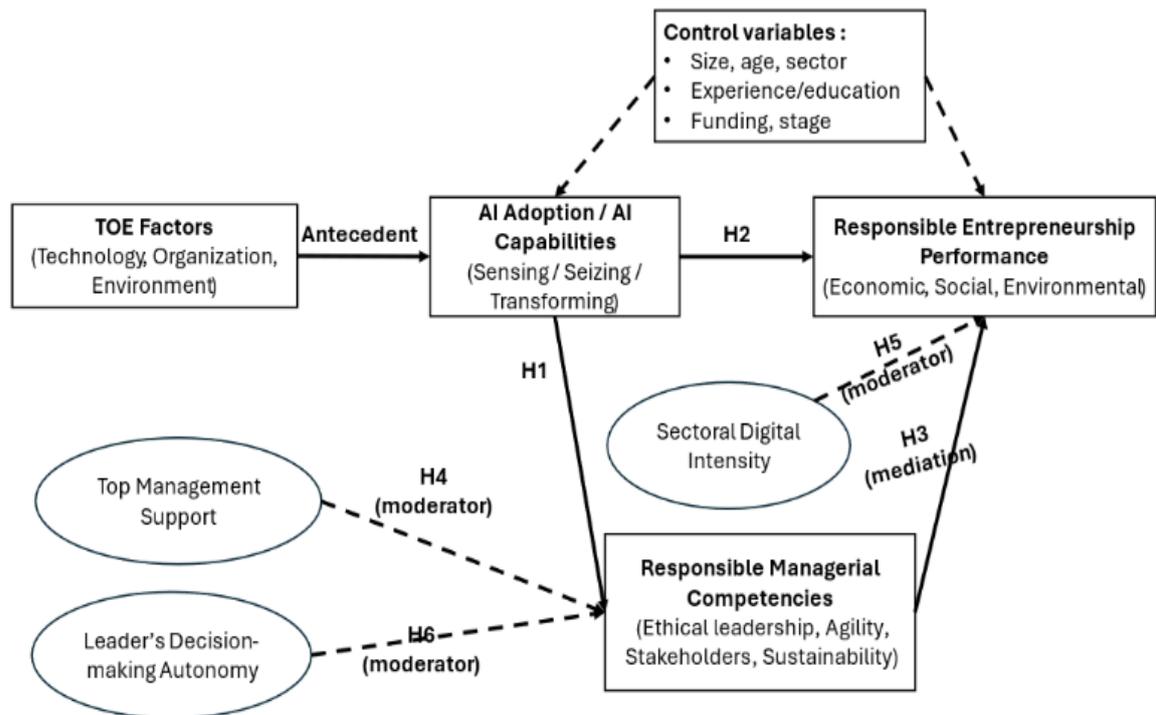
(By Autors)

Fig1. Conceptual model of artificial intelligence capabilities on responsible entrepreneurship performance.

III. METHODOLOGY

The study adopted a quantitative research design through an online survey of 263 executives, managers, and department heads from Moroccan SMEs across various sectors. Constructs were measured using 5-point Likert scales adapted from established literature, covering AI adoption [37], responsible managerial competencies [28][18], responsible entrepreneurship performance [1], organizational support [15], and decision-making autonomy [13]. To ensure validity, the survey was pre-tested with experts, and anonymity was guaranteed. Data analysis followed Anderson & Gerbing's two-step procedure [4], with Confirmatory Factor Analysis confirming reliability and Structural Equation Modeling applied to test hypotheses. The model showed excellent fit indices, bias checks were conducted, and ethical safeguards such as informed consent and GDPR compliance were respected. Limitations include the cross-sectional design, reliance on self-reports, and limited generalizability beyond Morocco.

IV. RESULTS

The study analyzed responses from 263 Moroccan SMEs representing diverse sectors, with firm sizes ranging from small to medium and an average managerial tenure of over a decade. Confirmatory Factor Analysis validated the constructs, with strong reliability and discriminant validity, while Structural Equation Modeling confirmed an

excellent overall model fit. These results ensured that the framework developed for examining AI adoption and managerial capabilities was statistically sound.

Findings showed that AI adoption significantly enhanced managerial competencies (β = 0.47) and directly improved responsible entrepreneurship performance (β = 0.31). In addition, managerial competencies played a mediating role, with AI influencing performance both directly and indirectly through the strengthening of leaders' skills and practices. This highlights AI's dual function as a technological driver and a catalyst for human development in SMEs.

The results also demonstrated the importance of contextual and organizational factors. Organizational support reinforced the relationship between AI and managerial competencies, while sectoral digital intensity amplified AI's effect on performance. Furthermore, decision-making autonomy positively influenced the development of competencies, reflecting the role of leadership empowerment in maximizing AI's benefits. Together, these findings show that AI adoption, when coupled with supportive conditions, can drive both managerial transformation and improved entrepreneurial performance.

V. Discussion

The findings confirm AI's central role as a catalyst for transforming managerial competencies in Moroccan SMEs, validating both the dynamic capabilities framework [33] and the concept of the "augmented entrepreneur" [32].

AI shows a dual influence: directly improving performance (β = 0.31) and indirectly doing so through competency-building (β = 0.22), underscoring the need for executive training [27][37].

Contextual factors matter, as organizational support [15], sectoral digital intensity, and leader autonomy [13] significantly reinforce AI's impact.

Firm size and age showed no significant effects, suggesting AI benefits are accessible to all firms, challenging traditional innovation views [30].

In Morocco's context, AI may serve as a leapfrogging tool, though digital fragmentation and training gaps remain challenges for future adoption [26].

VI. Conclusion

This research demonstrates that Artificial Intelligence (AI) is not merely a technical tool but a strategic lever for transforming managerial practices and fostering responsible entrepreneurship in Moroccan SMEs. Structural equation modeling shows that AI adoption directly improves performance and indirectly strengthens responsible managerial competencies, reflecting both technical and human transformation. Contextual factors such as organizational support, sectoral digital intensity, and decision-making autonomy further shape these effects. Theoretically, the study extends the dynamic capabilities view [34][33], combines the TOE framework [30] with self-determination theory [13], and underlines the importance of emerging economies in hybrid technological adoption [26]. Practically, it highlights the need for SME leaders to complement AI adoption with ethical, agile, and sustainability-oriented training [18][22][29], while policymakers should design tailored strategies that make AI a "leveling field" between SMEs and large firms [7][11]. Despite methodological limitations, the study positions Morocco as a relevant case of responsible digitalization, proving that AI is a catalyst for inclusive and sustainable entrepreneurship [1][2] while raising ethical and institutional challenges [6][20].

Beyond these contributions, this research emphasizes that the impact of AI on responsible entrepreneurship cannot be fully understood without considering the broader institutional and governance context in which SMEs operate. In emerging economies such as Morocco, the effectiveness of AI adoption depends not only on technological readiness but also on the quality of managerial governance, access to skills, and the coherence of public support mechanisms. By highlighting the interplay between technological innovation, managerial capabilities, and contextual constraints, this study contributes to a more nuanced understanding of responsible digital transformation and opens avenues for future research exploring the long-term and comparative dynamics of AI-driven entrepreneurship across developing economies.

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