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Entrepreneurial Ecosystems in GCC and North Africa: ESG Digital Nexus

Samantha Raed ^{1,*}

¹ *College of Economics and Management, Al Qasimia University, Sharjah, UAE*

*Corresponding author. Email: Samraed2020@gmail.com

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Abstract

This study investigates how institutional structures, resource capacities, entrepreneurial orientation, digital transformation readiness, and Environmental, Social, and Governance (ESG) integration shape the development of entrepreneurial ecosystems in North Africa and the Gulf Cooperation Council (GCC) countries. It applies the ESG–Digital Nexus perspective to explain differences in ecosystem maturity, innovation capacity, and sustainability-driven entrepreneurship across regions. A qualitative descriptive comparative design was employed, relying on secondary data from peer-reviewed journal articles, policy reports, and institutional publications published between 2018 and 2025. The analysis covers Egypt, Morocco, Tunisia, and Algeria in North Africa and compares them with Saudi Arabia, the United Arab Emirates, Qatar, and Oman in the GCC. A theory-guided thematic comparative analysis was conducted using an integrated framework combining Institutional Theory, the Resource-Based View (RBV), and the Entrepreneurial Orientation Model (EOM). The findings reveal clear regional disparities, with GCC countries demonstrating stronger institutional quality, more advanced digital infrastructure, greater access to entrepreneurial finance, higher ESG integration, and more innovation-oriented entrepreneurial cultures. In contrast, North African ecosystems face institutional fragmentation, limited financing opportunities, uneven digital readiness, and weaker ESG institutionalization. Overall, the findings indicate that entrepreneurial ecosystem maturity is driven by the interaction of institutional quality, resource capacity, entrepreneurial behaviour, digital transformation, and ESG governance, rather than by economic resources alone. The study is limited by its reliance on secondary qualitative data, which restricts firm-level insights and real-time assessment, and by differences in data availability and reporting standards across countries that may affect comparability. The findings suggest that policymakers should strengthen institutional quality, expand access to entrepreneurial finance, accelerate digital infrastructure development, and embed ESG principles into entrepreneurship support systems to improve ecosystem competitiveness and sustainability. The study contributes to the literature by developing an integrated ESG–Digital Nexus framework that unifies institutional, resource, behavioural, digital, and ESG dimensions into a comprehensive explanation of entrepreneurial ecosystem development and applies this framework to a comparative analysis of entrepreneurial ecosystems across North Africa and the GCC.

Keywords: Entrepreneurial ecosystems; ESG–Digital Nexus; Digital transformation; Institutional quality; Resource-Based View (RBV); Entrepreneurial orientation; Foreign direct investment (FDI)

1. INTRODUCTION

Entrepreneurial ecosystems have become increasingly important for promoting innovation, economic diversification, competitiveness, and sustainable development in emerging economies. Across the Middle East and North Africa (MENA) region, entrepreneurship is now viewed as a strategic tool for reducing structural unemployment, strengthening private-sector participation, and supporting knowledge-based economic transformation. In recent years, these objectives have expanded beyond traditional economic

growth to include digital transformation and Environmental, Social, and Governance (ESG) priorities within the broader context of the creative economy. This transformation is closely associated with the growing convergence between sustainability and digitalization, conceptualized in this study as the ESG–Digital Nexus. Digital technologies such as artificial intelligence, blockchain, fintech, cloud computing, and big data analytics are reshaping entrepreneurial activity by improving innovation capacity, operational efficiency, and market accessibility. At the same time, ESG frameworks increasingly influence entrepreneurial ecosystems through greater emphasis on transparency, responsible governance, environmental sustainability, and inclusive growth. As a result, entrepreneurial ecosystem performance is no longer assessed solely through financial outcomes or startup density, but also through digital readiness, sustainability integration, and long-term innovation capacity [1].

Within this evolving environment, North Africa and the Gulf Cooperation Council (GCC) represent two strategically important yet structurally different entrepreneurial regions. This comparative study focuses exclusively on eight countries: Egypt, Morocco, Tunisia, and Algeria in North Africa, and Saudi Arabia, the United Arab Emirates, Qatar, and Oman in the GCC. These countries were selected because they represent contrasting levels of institutional development, entrepreneurial ecosystem maturity, digital transformation, ESG integration, and investment capacity, thereby providing suitable cases for comparative analysis. GCC countries have implemented ambitious diversification reforms aimed at transitioning from hydrocarbon-based economies toward digitally enabled and innovation-driven development models. National initiatives such as Saudi Vision 2030 emphasize entrepreneurship, digital infrastructure, sustainability governance, and private-sector expansion as key drivers of competitiveness and economic transformation [2]. Countries such as the United Arab Emirates, Saudi Arabia, and Qatar have invested significantly in innovation hubs, venture financing systems, and digital ecosystems to strengthen entrepreneurial ecosystem maturity.

Foreign direct investment (FDI) has also emerged as an important driver of entrepreneurial ecosystem development across the MENA region. In GCC economies, FDI contributes to technology transfer, venture capital expansion, digital infrastructure development, and international innovation partnerships, particularly within fintech, renewable energy, artificial intelligence, and smart city sectors. By contrast, several North African economies continue to experience uneven FDI inflows due to institutional uncertainty, regulatory inefficiencies, and weaker investment climates, limiting entrepreneurial scalability, innovation diffusion, and sustainability-oriented venture development [3]. In contrast, North African economies, including Egypt, Morocco, Tunisia, and Algeria, demonstrate substantial entrepreneurial potential supported by youthful populations, emerging startup cultures, and growing digital adoption [4]. However, entrepreneurial ecosystem development across these countries continues to face challenges related to institutional fragmentation, regulatory inefficiencies, financing constraints, and uneven digital infrastructure [5]. These structural limitations often reduce startup scalability and weaken sustainability-oriented innovation. Furthermore, entrepreneurial development in several North African contexts remains constrained by cultural risk aversion and limited institutional support for innovative ventures [6].

Although entrepreneurship has become a policy priority throughout the MENA region, major disparities remain in ecosystem maturity, governance quality, digital transformation readiness, and ESG institutionalization. Existing evidence suggests that GCC ecosystems generally possess stronger institutional frameworks, more advanced digital infrastructure, and better-developed financing systems than North African ecosystems [7]. Nevertheless, important variations also exist within GCC economies, particularly regarding ESG implementation, private-sector participation, and long-term sustainability integration. These differences indicate that entrepreneurial ecosystem performance depends not only on resource availability but also on institutional effectiveness, governance quality, and strategic alignment between digital transformation and sustainability objectives [8].

Despite growing scholarly attention to entrepreneurship in the MENA region, the literature remains fragmented in several respects. Many studies examine entrepreneurship, institutional development, digital transformation, entrepreneurial orientation, and ESG practices independently rather than as mutually reinforcing dimensions of entrepreneurial ecosystem development. Comparative research between North

Africa and the GCC is also limited, particularly regarding how governance quality, strategic resources, entrepreneurial behaviour, digital readiness, and sustainability governance interact to influence ecosystem maturity and innovation performance [9]. Consequently, existing studies provide only a partial understanding of entrepreneurial ecosystems because they do not explain how these institutional, resource, behavioural, digital, and sustainability dimensions operate as an integrated system across different regional contexts.

To address this gap, the present study adopts an integrated framework combining Institutional Theory [10], the Resource-Based View [11], and the Entrepreneurial Orientation Model [12] within the broader ESG–Digital Nexus perspective. Institutional Theory explains how formal and informal institutions shape entrepreneurial legitimacy and ecosystem stability, while the Resource-Based View highlights the importance of financial, technological, and institutional resources in achieving competitive advantage. Entrepreneurial Orientation emphasizes innovativeness, proactiveness, and risk-taking as drivers of entrepreneurial performance. Rather than applying these theories independently, this study integrates them within the ESG–Digital Nexus to explain how governance quality, resource capacity, entrepreneurial behaviour, digital transformation, and ESG integration jointly determine entrepreneurial ecosystem maturity. This integrated perspective extends existing literature by demonstrating that sustainable entrepreneurial ecosystem development emerges from the interaction of these dimensions rather than from any single determinant.

Recent empirical evidence further demonstrates that entrepreneurship is increasingly embedded within regional development strategies focused on innovation-led growth, sustainability transitions, and digital modernization [13]. Governments across MENA have introduced reforms aimed at improving regulatory efficiency, strengthening innovation ecosystems, attracting investment, and expanding access to entrepreneurial finance. However, the effectiveness of these reforms remains uneven because of differences in governance quality, institutional effectiveness, digital capability, and ESG integration [14]. Accordingly, this study investigates how institutional structures, resource capacities, entrepreneurial orientation, digital transformation readiness, and ESG integration shape entrepreneurial ecosystem development across the eight selected countries during the period 2018–2025. Using a qualitative descriptive comparative design based on secondary evidence, the study addresses four interrelated research questions concerning institutional determinants, digital transformation, resource capacity, and entrepreneurial orientation within the ESG–Digital Nexus framework. These analytical dimensions are consistently reflected throughout the methodology, results, discussion, and conclusions.

This study contributes to entrepreneurial ecosystem literature by proposing an integrated analytical framework that combines Institutional Theory, the Resource-Based View, the Entrepreneurial Orientation Model, and the ESG–Digital Nexus to explain variations in entrepreneurial ecosystem maturity across North Africa and the GCC. By linking governance quality, resource capacity, entrepreneurial behaviour, digital transformation, ESG integration, and investment dynamics within a single ecosystem framework, the study offers a more comprehensive explanation of entrepreneurial ecosystem development than previous studies examining these dimensions separately. The findings also provide practical guidance for policymakers, investors, and innovation agencies seeking to strengthen inclusive, digitally enabled, and sustainability-oriented entrepreneurial ecosystems in emerging economies.

2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

This section reviews the literature on entrepreneurial ecosystems, sustainability, and digital transformation while establishing the theoretical foundation of the study. The study develops an integrated analytical perspective by combining Institutional Theory, the Resource-Based View (RBV), and the Entrepreneurial Orientation Model (EOM) within the ESG–Digital Nexus framework to explain differences in entrepreneurial ecosystem maturity across North Africa and the GCC.

2.1. Entrepreneurial Ecosystems, Sustainability, and the ESG–Digital Nexus

Entrepreneurial ecosystems are increasingly recognized as important drivers of innovation, economic diversification, competitiveness, and sustainable development, particularly in emerging economies. In the

Middle East and North Africa (MENA) region, entrepreneurship has become closely linked with national strategies aimed at strengthening private-sector development, accelerating digital transformation, and supporting knowledge-based economic growth [15]. Innovation ecosystems increasingly facilitate digital entrepreneurship, while entrepreneurship contributes to economic competitiveness and sustainable transformation across emerging markets [16]. Within this context, the convergence between sustainability and digitalization has created a new strategic perspective, conceptualized in this study as the ESG–Digital Nexus [17].

The ESG–Digital Nexus is positioned as an ecosystem mechanism in which digital transformation and ESG integration mutually reinforce each other rather than operate as separate drivers. Digital technologies—including artificial intelligence, blockchain, fintech, cloud computing, and big data analytics—enhance entrepreneurial capabilities by improving efficiency, transparency, resource optimization, market access, and innovation capacity. At the same time, ESG principles provide strategic direction for digital transformation by encouraging responsible technology adoption, sustainable innovation, ethical governance, and inclusive economic development [18]. Therefore, entrepreneurial ecosystems achieve higher maturity when digital capabilities are embedded within sustainability-oriented governance systems rather than pursued independently.

Digital transformation has become increasingly important for entrepreneurial ecosystem development because it enables startups and firms to access new markets, improve operational capabilities, and develop innovative solutions. However, digital advancement alone does not guarantee sustainable ecosystem development. Without effective governance, institutional support, and sustainability frameworks, digital technologies may generate limited ecosystem value. Conversely, ESG-oriented policies strengthen the ability of ecosystems to convert technological capabilities into long-term environmental, social, and economic outcomes [19].

Foreign direct investment (FDI) also represents an important component of the ESG–Digital Nexus by supporting technology transfer, innovation diffusion, venture financing, and international entrepreneurial collaboration. GCC economies have attracted significant FDI into fintech, renewable energy, artificial intelligence, and smart city initiatives, strengthening digital ecosystems and sustainability-oriented entrepreneurship. In contrast, several North African economies continue to experience weaker investment inflows because of regulatory uncertainty, institutional constraints, and limited investment capacity [20].

Sustainability-oriented entrepreneurship is particularly relevant in resource-sensitive regions such as North Africa and the GCC. Entrepreneurial activities in renewable energy, sustainable agriculture, environmental technologies, and circular economy initiatives contribute to climate resilience and resource efficiency [21]. The Water–Energy–Food–Environment (WEFE) nexus further highlights the role of entrepreneurial ecosystems in addressing interconnected sustainability challenges through innovation and resource management [22]. These developments demonstrate that entrepreneurial ecosystems increasingly depend on the interaction between sustainability governance, digital capability, and innovation capacity [23].

Despite these developments, significant differences remain between North Africa and GCC ecosystems. GCC countries have invested heavily in digital infrastructure, innovation systems, and entrepreneurship support mechanisms through diversification strategies and state-led investment programs [24]. In contrast, North African ecosystems continue to face institutional fragmentation, financing limitations, regulatory inefficiencies, and uneven digital transformation, reducing venture scalability and ESG integration [6]. These differences indicate that ecosystem performance cannot be explained by resources alone but requires consideration of institutional conditions, resource capabilities, entrepreneurial behaviour, digital readiness, and sustainability governance.

2.2. Theoretical Framework

This study integrates Institutional Theory, RBV, and EOM because entrepreneurial ecosystem development is a multidimensional process involving institutional conditions, resource availability, and entrepreneurial behaviour. These theories provide complementary explanations: Institutional Theory explains

how external systems enable or constrain entrepreneurship; RBV explains how ecosystem resources create innovation capacity; and EOM explains how entrepreneurial actors transform opportunities into innovative and sustainable ventures. Together, they provide a comprehensive foundation for analysing ecosystem maturity within the ESG–Digital Nexus framework.

2.2.1. Institutional Theory and Entrepreneurial Ecosystem Development

Institutional Theory explains how formal and informal institutional arrangements influence entrepreneurial activity, legitimacy, and ecosystem performance [10]. Entrepreneurial ecosystems depend on institutional environments that reduce uncertainty, support investment, and encourage innovation. In this study, institutional conditions are analysed through five dimensions: governance quality, regulatory efficiency, policy coordination, institutional stability, and ESG governance.

Strong institutional systems improve entrepreneurial outcomes by creating predictable regulations, strengthening investor confidence, supporting digital transformation, and facilitating sustainability-oriented development [26]. GCC countries demonstrate stronger institutional alignment through national diversification strategies such as Saudi Vision 2030, UAE innovation strategies, and Oman Vision 2040, which integrate entrepreneurship, digital transformation, sustainability, and investment development [2].

In contrast, North African ecosystems continue to experience challenges related to fragmented governance, bureaucratic inefficiencies, inconsistent regulations, and limited policy coordination [29]. Although reforms in countries such as Morocco and Tunisia have supported entrepreneurship and renewable energy development, institutional limitations continue to affect ecosystem maturity and ESG implementation [30]. Therefore, Institutional Theory explains how governance structures shape entrepreneurial ecosystem performance and sustainability outcomes [27].

2.2.2. Resource-Based View (RBV)

The Resource-Based View argues that competitive advantage depends on access to valuable, rare, and difficult-to-replicate resources [31]. Within entrepreneurial ecosystems, resources determine the capacity of ventures and institutions to support innovation, sustainability transitions, and digital transformation [32]. This study operationalizes resource capacity through six dimensions: financial capital, venture financing, technological infrastructure, human capital, innovation capability, and foreign direct investment (FDI). GCC ecosystems benefit from sovereign wealth funds, venture capital networks, advanced digital infrastructure, and government-backed investment mechanisms that support technology-driven and sustainability-oriented entrepreneurship [24]. Institutions such as Saudi Arabia's Public Investment Fund and Qatar Development Bank demonstrate how strategic resources enhance innovation capacity and ecosystem competitiveness [11].

FDI further strengthens GCC ecosystems by providing access to international technologies, strategic partnerships, and global innovation networks [33]. Conversely, North African ecosystems face limited venture financing, weaker technological infrastructure [34], and restricted access to sustainability-linked investment mechanisms, limiting startup scalability and innovation diffusion [35]. RBV therefore explains why differences in resource availability contribute to regional variations in ecosystem maturity [36].

2.2.3. Entrepreneurial Orientation Model (EOM)

The Entrepreneurial Orientation Model focuses on innovativeness, proactiveness, and risk-taking as key behavioural characteristics influencing entrepreneurial performance [12]. Within the ESG–Digital Nexus, EOM explains how entrepreneurs transform institutional opportunities and available resources into innovation-driven and sustainability-oriented ventures.

Innovativeness supports technology adoption and sustainable solutions, proactiveness encourages opportunity recognition and market expansion, while risk-taking influences willingness to pursue uncertain but potentially transformative ventures [37]. GCC countries demonstrate stronger entrepreneurial orientation through incubators, innovation competitions, entrepreneurship education, and digital startup programs [38]. In contrast, North African ecosystems often experience higher risk aversion due to financing limitations, institutional uncertainty, and restricted innovation exposure [39].

Therefore, EOM explains how entrepreneurial behaviour influences ecosystem adaptability, innovation capacity, digital transformation, and sustainability-oriented entrepreneurship [40].

2.2.4. Research Gap

Although existing studies examine entrepreneurship, institutional development, digital transformation, sustainability, and resources in emerging economies, significant gaps remain. Previous research has largely investigated these dimensions separately, providing limited explanation of how governance quality, resource capacity, entrepreneurial behaviour, digital transformation, and ESG integration interact to shape ecosystem maturity. Furthermore, comparative evidence between GCC and North African ecosystems remains limited, particularly regarding how different institutional and resource environments influence sustainability-oriented entrepreneurship and digital innovation. This study addresses this gap by integrating Institutional Theory, RBV, and EOM within the ESG–Digital Nexus framework to provide a comparative explanation of entrepreneurial ecosystem development across the two regions.

2.2.5. Integrated Theoretical Framework

The integrated framework proposes that entrepreneurial ecosystem maturity emerges through a sequential and interconnected mechanism. First, institutions create the enabling environment through governance quality, regulatory effectiveness, policy coordination, and ESG governance. Second, effective institutions facilitate access to resources, including finance, technology, human capital, innovation capabilities, and FDI [41]. Third, these resources support digital transformation by enabling technological adoption and innovation capacity. Fourth, entrepreneurial orientation activates these resources through innovativeness, proactiveness, and risk-taking. Finally, ESG integration ensures that digital and entrepreneurial activities generate sustainable economic, social, and environmental outcomes [42].

This integrated perspective explains why GCC ecosystems generally demonstrate higher maturity through stronger institutional systems, greater resource availability, advanced digital capabilities, and stronger ESG integration, whereas North African ecosystems remain constrained by institutional fragmentation and resource limitations [43]. Thus, the ESG–Digital Nexus contributes to entrepreneurial ecosystem literature by demonstrating that sustainability and digital transformation jointly function as reinforcing mechanisms that shape innovation capacity, competitiveness, and long-term ecosystem resilience. Figure 1 presents the proposed integrated theoretical framework linking institutional conditions, resources, entrepreneurial orientation, digital transformation, ESG integration, and entrepreneurial ecosystem outcomes [44].

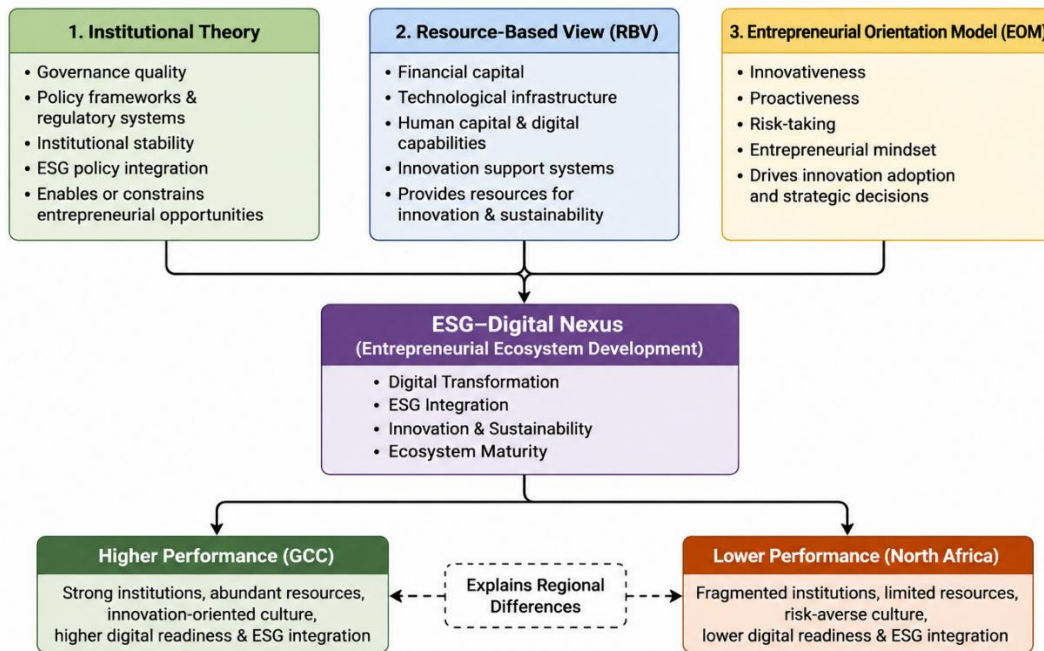


Figure 1. Integrated ESG–Digital Nexus Framework for Entrepreneurial Ecosystem Development

Source: Author Works

3. METHODOLOGY

This study employs a qualitative descriptive comparative research design to explore how institutional arrangements, resource configurations [45], entrepreneurial orientation, digital transformation readiness, and ESG integration collectively shape entrepreneurial ecosystem development in North Africa and the Gulf Cooperation Council (GCC). A qualitative approach is suitable for this inquiry because it enables an in-depth interpretation of complex, context-dependent relationships among governance structures, entrepreneurship dynamics, sustainability transitions, and digital transformation processes, rather than focusing on hypothesis testing or quantifiable causal estimation [46]. Specifically, a qualitative comparative design is appropriate because entrepreneurial ecosystems represent complex socio-economic systems shaped by interactions among institutions, resources, entrepreneurial behaviour, technology, and sustainability mechanisms. Such ecosystem-level relationships cannot be adequately captured through isolated quantitative indicators alone. Therefore, secondary qualitative analysis enables systematic examination of contextual differences, policy environments, and structural conditions influencing ecosystem development across countries. The design is specifically selected to support cross-regional comparison and theory-driven interpretation of entrepreneurial ecosystem variation within the ESG–Digital Nexus framework.

3.1. Research Design and Approach

The research is based entirely on secondary data analysis to ensure broad comparative coverage across multiple countries and entrepreneurial ecosystems within the MENA region. The use of secondary qualitative data is justified because the objective of this study is not to estimate causal relationships at the firm level, but rather to understand how national-level institutional, resource, digital, and sustainability conditions collectively influence entrepreneurial ecosystem maturity. This approach enables comparison of multiple countries using consistent documentary evidence, including policy strategies, institutional reports, academic studies, and international databases.

Data were gathered from peer-reviewed academic publications, government reports, institutional policy documents, sustainability frameworks, and international organizational databases. Sources were drawn from major academic platforms such as Scopus, Web of Science, Google Scholar, and ScienceDirect. Complementary evidence was obtained from institutional bodies including the World Bank, the Organization for Economic Co-operation and Development (OECD), the United Nations Development Program (UNDP), and relevant regional development organizations, enabling a robust cross-country comparative perspective.

3.2. Country Selection Rationale

The study focuses on selected national cases representing both North Africa and the GCC. The North African cases include Egypt, Morocco, Tunisia, and Algeria, while the GCC cases comprise Saudi Arabia, the United Arab Emirates, Qatar, and Oman, resulting in a total sample of eight countries. The country selection follows a purposive comparative sampling approach because these cases represent distinct entrepreneurial ecosystem conditions within the MENA region. Specifically, the selected countries demonstrate meaningful variation in institutional quality, entrepreneurial ecosystem maturity, digital transformation readiness, ESG integration, investment capacity, and resource availability.

The GCC countries were selected because they represent relatively advanced entrepreneurial ecosystems characterized by stronger institutional coordination, greater financial resources, accelerated digital transformation, and increasing integration of sustainability objectives into national development strategies. In contrast, the selected North African countries represent emerging entrepreneurial ecosystems where institutional reform, financing constraints, uneven digital development, and sustainability integration remain important challenges.

The selection of these countries is based on a purposive comparative logic that ensures representation of contrasting levels of entrepreneurial ecosystem maturity, institutional development, digital infrastructure readiness, ESG integration, and investment attractiveness within the MENA region. Together, these eight cases provide a meaningful comparative setting for examining how different institutional and resource configurations influence entrepreneurial ecosystem development under similar regional and global economic pressures. These countries were selected because they collectively represent both relatively advanced (GCC) and structurally constrained (North Africa) entrepreneurial systems, allowing meaningful cross-regional comparison of ecosystem evolution under similar global economic pressures but different institutional and resource conditions. Accordingly, the analysis is limited to these eight selected countries, and no additional countries outside this defined scope are included in the comparative assessment.

3.3. Data Collection and Sources

The literature selection process focused primarily on studies and institutional reports published between 2018 and 2025 to ensure relevance to recent developments in entrepreneurship, ESG integration, and digital transformation within the MENA region. This timeframe was selected because it captures recent policy reforms, digital transformation initiatives, ESG developments, and entrepreneurial ecosystem changes occurring across the selected countries. Foundational theoretical works, including Institutional Theory, RBV, and Entrepreneurial Orientation Theory, were retained regardless of publication year because they provide the conceptual foundations of the study. Keywords used during the search process included “entrepreneurial ecosystems,” “digital transformation,” “ESG,” “sustainability entrepreneurship,” “GCC entrepreneurship,” “North Africa entrepreneurship,” and “innovation ecosystems.” Priority was given to peer-reviewed sources, internationally recognized institutional publications, and studies directly addressing entrepreneurial ecosystem development within emerging economies. All empirical sources used for country-level comparison were selected based on relevance to the study objectives and alignment with the 2018–2025 analytical period.

3.4. Analytical Strategy: Thematic Comparative Analysis

The study uses systematic thematic comparative analysis to examine and synthesize qualitative evidence across countries. Thematic analysis followed a structured three-stage procedure: (1) data familiarization and

coding, (2) theme development and clustering, and (3) cross-regional comparison and interpretation. The coding framework was developed deductively from the three theoretical perspectives guiding the study: Institutional Theory, the Resource-Based View (RBV), and the Entrepreneurial Orientation Model (EOM). Institutional Theory informed coding categories related to governance quality, regulatory systems, institutional support, policy coordination, and ESG governance mechanisms. RBV guided the identification of resource-related themes, including financial capital, technological infrastructure, human capital, innovation capabilities, and foreign direct investment (FDI). EOM informed behavioural dimensions, including innovativeness, proactiveness, risk-taking, entrepreneurial culture, and adaptive capability.

First, data from selected literature and policy documents were coded according to predefined analytical categories derived from the research objectives and theoretical framework. These categories included institutional quality, entrepreneurial finance, digital infrastructure development, ESG governance mechanisms, innovation capacity, entrepreneurial orientation, sustainability-driven entrepreneurship, and investment dynamics, including foreign direct investment (FDI). Second, coded data were organized into higher-order themes reflecting structural and functional dimensions of entrepreneurial ecosystems. Third, a cross-case comparative analysis was conducted between GCC and North African ecosystems to identify convergence patterns, structural disparities, ecosystem constraints, and policy implications affecting entrepreneurial ecosystem performance. This process enabled systematic identification of similarities and differences across regions rather than descriptive reporting alone.

3.5 Theoretical Framework Guiding Analysis

The analytical framework is guided by three complementary theoretical lenses: Institutional Theory, the Resource-Based View (RBV), and the Entrepreneurial Orientation Model (EOM).

During analysis, these theories were used as interpretive lenses connecting empirical evidence with ecosystem development mechanisms. Institutional Theory was applied to interpret differences in governance quality, regulatory effectiveness, policy coordination, and ESG institutionalization across countries. RBV was used to analyse how differences in financial resources, technological capabilities, infrastructure, human capital, and investment capacity influence ecosystem competitiveness. EOM was applied to examine how entrepreneurial behaviours, including innovation, proactiveness, and risk-taking, contribute to ecosystem adaptability and sustainability-oriented entrepreneurship. Institutional Theory is applied to assess how regulatory environments, governance quality, and institutional frameworks influence entrepreneurial stability and ESG adoption. RBV is used to examine how financial capital, technological infrastructure, human capital, and innovation capabilities contribute to competitiveness and digital transformation capacity. EOM provides insight into behavioural dimensions such as innovativeness, proactiveness, and risk-taking, which shape entrepreneurial adaptability and sustainability-oriented innovation.

Accordingly, the integration of these theories provides a comprehensive analytical framework in which institutional conditions create opportunities, resources enable ecosystem capabilities, and entrepreneurial behaviour activates innovation and sustainability outcomes within the ESG–Digital Nexus framework.

3.6 Methodological Alignment and Limitations

This methodological design aligns with the study's objectives by enabling a structured comparative analysis of institutional, financial, cultural, digital, ESG, and investment-related factors across two regional contexts. It also supports examination of how GCC diversification strategies contribute to more digitally advanced and ESG-integrated entrepreneurial ecosystems.

However, the qualitative secondary-data approach has limitations, including variations in data availability, inconsistent reporting standards, and differing levels of institutional transparency across countries. Additionally, reliance on secondary sources limits the ability to capture firm-level entrepreneurial experiences, individual decision-making processes, and real-time ecosystem dynamics. Differences in national reporting practices and ESG measurement approaches may also influence cross-country comparability.

Reliance on secondary sources also limits insights into real-time entrepreneurial behaviour and firm-level dynamics, while inconsistencies in ESG and ecosystem indicators may affect comparability. Nevertheless, the selected methodology remains appropriate because the purpose of the study is to provide a comparative ecosystem-level understanding of how institutional, resource, behavioural, digital, and sustainability factors interact across countries. Despite these constraints, the approach remains suitable for producing a comprehensive and policy-relevant analysis within the ESG–Digital Nexus framework.

4. RESULTS

The comparative analysis shows clear differences between North Africa and the GCC in institutional quality, digital readiness, financial access, entrepreneurial orientation, ESG integration, and FDI dynamics. It highlights that ecosystem performance depends on the interaction of governance, digital capability, finance, sustainability, and innovation systems rather than isolated factors. To enhance transparency and traceability of the qualitative comparative analysis, the findings are supported by country-level evidence synthesis across the eight selected countries (Egypt, Morocco, Tunisia, Algeria, Saudi Arabia, the United Arab Emirates, Qatar, and Oman), covering the main analytical dimensions derived from the theoretical framework. Table 2 presents the evidence base, source types, and analytical periods supporting the comparative findings.

4.1. Institutional and Policy Factors Shaping Entrepreneurial Ecosystems

In relation to the study's research objectives on institutional determinants of entrepreneurial ecosystem development, the findings indicate that institutional quality is a central differentiating factor between the GCC and North Africa [47]. Across the GCC cases, Saudi Arabia, the United Arab Emirates, Qatar, and Oman demonstrate relatively stronger institutional coordination through national diversification strategies, entrepreneurship policies, innovation programs, and sustainability-oriented governance reforms. GCC countries demonstrate comparatively advanced institutional environments characterized by coherent policy coordination, regulatory reforms, and strong state-led support for entrepreneurship [48]. National diversification strategies such as Saudi Vision 2030, UAE innovation strategies, and Qatar's entrepreneurship initiatives position entrepreneurship as a core mechanism for economic transformation, digital modernization, and sustainability integration [2]. Similarly, Oman Vision 2040 contributes to strengthening entrepreneurship, private-sector development, and innovation capacity through institutional reform initiatives.

Government-backed incubators, accelerators, free zones, and investment authorities further enhance regulatory efficiency and ecosystem coordination. In addition, GCC countries have increasingly attracted foreign direct investment into technology, renewable energy, fintech, and innovation sectors, contributing to entrepreneurial ecosystem expansion, knowledge transfer, and integration into global value chains [49]. These institutional advantages also strengthen startup survival capacity, investor confidence, ESG policy implementation, and long-term entrepreneurial scalability across GCC ecosystems.

In contrast, North African entrepreneurial ecosystems remain institutionally fragmented and constrained. Across Egypt, Morocco, Tunisia, and Algeria, entrepreneurial development has progressed through startup policies, innovation initiatives, and digital entrepreneurship programs; however, institutional limitations continue to affect ecosystem scalability. Although Morocco and Tunisia have introduced reforms to support entrepreneurship and digital innovation, persistent bureaucratic inefficiencies, inconsistent regulations, and weak policy coordination continue to hinder ecosystem development [50]. In Algeria, institutional instability, state-dominated economic structures, and limited private-sector flexibility further restrict entrepreneurial scalability and innovation capacity [51]. These institutional weaknesses also reduce the region's ability to attract stable long-term foreign investment capable of supporting entrepreneurial innovation and digital transformation [52]. The findings further indicate that weak governance structures reduce entrepreneurial confidence, delay digital policy implementation, and weaken sustainability-oriented entrepreneurial initiatives in several North African economies. These institutional differences also influence ESG adoption and digital transformation integration. GCC economies increasingly embed sustainability governance and digital innovation into national development agendas, whereas ESG institutionalization in North Africa

remains uneven and fragmented. Accordingly, institutional quality emerges as a foundational determinant of ecosystem development and directly addresses the study's first research objective concerning governance and performance differences between the two regions [53].

4.2. Digital Transformation and Innovation Readiness

Addressing the research objective related to digital readiness and technological transformation, the findings reveal pronounced regional disparities in digital infrastructure and innovation capacity [54]. Country-level evidence indicates that GCC economies have developed stronger digital ecosystems through national artificial intelligence strategies, smart city programs, fintech development initiatives, and advanced digital government platforms. Saudi Arabia and the United Arab Emirates represent the most advanced cases, with substantial investments in AI, digital infrastructure, fintech ecosystems, and technology-based entrepreneurship. Qatar and Oman have also implemented digital transformation strategies supporting innovation capacity and entrepreneurship development.

GCC ecosystems demonstrate strong digital transformation readiness supported by advanced infrastructure, artificial intelligence initiatives, smart city development, and technology-driven investment strategies. Countries such as the United Arab Emirates and Saudi Arabia have developed highly integrated digital entrepreneurial ecosystems that support fintech, e-commerce, renewable energy technologies, and platform-based innovation models [11]. The findings also show that GCC ecosystems increasingly support AI-driven entrepreneurship, digitally integrated startup ecosystems, and sustainability-oriented innovation platforms linked to smart governance agendas. Digital transformation in the GCC is closely aligned with economic diversification strategies, where innovation hubs, incubators, and university–industry partnerships facilitate knowledge transfer and startup development. These dynamics reinforce the ESG–Digital Nexus, where sustainability objectives are increasingly integrated with digital entrepreneurship [55]. Furthermore, foreign direct investment has played an important role in accelerating technological modernization through multinational partnerships, infrastructure investment, and digital ecosystem collaboration across GCC economies [56]. The analysis additionally indicates that digitally advanced ecosystems in the GCC demonstrate stronger innovation competitiveness and greater integration into international entrepreneurial networks.

Conversely, North African ecosystems remain constrained by infrastructural gaps, uneven digital access, and limited technological diffusion. Egypt, Morocco, Tunisia, and Algeria have introduced digital transformation initiatives; however, differences in infrastructure quality, digital skills, and innovation capacity continue to limit ecosystem maturity. Despite initiatives such as Plan Maroc Digital 2020 and startup support programs in Tunisia, challenges related to digital literacy, rural–urban disparities, and infrastructure deficits continue to restrict ecosystem scalability [57]. Consequently, digital entrepreneurship remains less mature and less systematically linked to sustainability-oriented development strategies in North Africa. Limited foreign investment inflows into high-technology sectors further constrain innovation diffusion and reduce opportunities for digital entrepreneurial expansion within several North African economies [58]. These limitations also weaken startup competitiveness and reduce the ability of entrepreneurial ventures to integrate advanced digital and ESG-oriented innovation practices.

4.3. Financial Ecosystems and Entrepreneurial Resource Capacity

In relation to the resource-based objective of the study, the findings highlight access to finance as one of the most significant structural determinants of entrepreneurial ecosystem divergence. The comparative evidence indicates that GCC countries possess stronger entrepreneurial finance ecosystems due to sovereign wealth funds, venture capital markets, public investment institutions, and international investment partnerships. GCC countries benefit from well-developed financial ecosystems supported by sovereign wealth funds, venture capital networks, public investment agencies, and entrepreneurship-focused financing programs. Institutions such as Qatar Development Bank and Saudi Arabia's Public Investment Fund provide targeted support for startups operating in technology-intensive, renewable energy, and innovation-driven sectors [59]. The United Arab Emirates, in particular, demonstrates a highly mature entrepreneurial finance

environment driven by tax incentives, global investment integration, and free zone ecosystems [60]. The strong presence of international investors and foreign direct investment within GCC entrepreneurial ecosystems further strengthens startup financing opportunities, international market access, and technological competitiveness [61]. The findings additionally demonstrate that GCC ecosystems benefit from stronger green finance mechanisms, sustainability-linked investment instruments, and venture financing systems that support ESG-oriented entrepreneurial growth.

In contrast, North African entrepreneurial ecosystems face structural financial constraints characterized by limited venture capital availability, conservative banking systems, and weak financial inclusion mechanisms [62]. Although Egypt, Morocco, Tunisia, and Algeria have experienced growth in startup-support programs and entrepreneurship financing initiatives, access to early-stage capital remains comparatively limited. Entrepreneurs in Morocco, Algeria, and Tunisia frequently rely on informal financing channels, microfinance institutions, or donor-supported funding due to underdeveloped formal entrepreneurial finance systems [50]. These constraints significantly limit venture scalability and reduce the capacity for ESG-oriented and digitally enabled entrepreneurship. Lower levels of foreign direct investment and weaker integration into international financing networks also restrict entrepreneurial access to advanced technologies, strategic partnerships, and large-scale innovation funding [63]. The persistence of informal financing structures further reinforces small-scale entrepreneurial activities and reduces long-term startup sustainability across several North African ecosystems.

4.4. Entrepreneurial Orientation, Culture, and Social Dynamics

In relation to behavioural and cultural dimensions of entrepreneurial ecosystems, the findings demonstrate that entrepreneurial orientation varies significantly between the two regions, influencing innovation capacity and risk-taking behaviour. The comparative evidence suggests that entrepreneurial behaviour is influenced not only by cultural factors but also by institutional support, financing availability, education systems, and exposure to innovation ecosystems. In North Africa, entrepreneurial activity is often characterized by risk aversion, preference for employment stability, and limited tolerance for failure [7]. Family-oriented business structures and economic uncertainty further reinforce conservative entrepreneurial behaviour, limiting engagement in technology-intensive and innovation-driven ventures. The findings also reveal that informal entrepreneurial sectors remain highly significant within several North African economies, particularly where limited institutional support and restricted financing opportunities constrain formal entrepreneurial expansion [64].

By contrast, GCC countries exhibit relatively stronger entrepreneurial orientation, supported by government-led innovation initiatives, entrepreneurship education programs, and incubator systems. Universities, accelerators, and innovation competitions increasingly promote creativity, experimentation, and startup formation [38]. Saudi Arabia, the UAE, Qatar, and Oman have expanded entrepreneurship education, innovation hubs, startup competitions, and accelerator programs to encourage innovation-oriented entrepreneurial behaviour. However, despite these advancements, cultural constraints such as fear of failure and reliance on public-sector employment persist in certain GCC contexts. Nevertheless, GCC entrepreneurial ecosystems demonstrate greater adaptability to digital transformation, AI-driven entrepreneurship, and sustainability-oriented innovation compared to most North African ecosystems [65].

Gender dynamics also represent a cross-regional constraint. While female entrepreneurship has expanded in GCC countries through policy initiatives linked to Saudi Vision 2030 and women empowerment programs [66], structural barriers related to financing, networks, and mentorship remain. In North Africa, these challenges are more pronounced because of weaker institutional support systems and less developed entrepreneurial ecosystems [67].

4.5. Comparative Ecosystem Maturity and Integrated Synthesis

Overall, the findings confirm that GCC entrepreneurial ecosystems demonstrate significantly higher levels of entrepreneurial ecosystem development compared to North African ecosystems. This conclusion directly addresses the study's central comparative objective. Table 1 summarizes the major comparative

differences between GCC and North African entrepreneurial ecosystems across institutional quality, digital transformation, financing systems, ESG integration, entrepreneurial orientation, and innovation capacity.

Table 1. Major Comparative Differences Between GCC and North African

Dimension	GCC Ecosystems	North African Ecosystems
Institutional Quality	Strong regulatory coordination and policy integration	Fragmented governance and regulatory inefficiencies
Digital Transformation	Advanced digital infrastructure and AI integration	Uneven digital access and infrastructure limitations
Financial Ecosystems	Strong venture capital and green finance systems	Limited formal financing and reliance on informal finance
ESG Integration	Increasingly institutionalized within national strategies	Uneven and fragmented ESG implementation
Entrepreneurial Orientation	Innovation-driven and supported by incubators	More risk-averse and necessity-driven
FDI Integration	Strong integration into global innovation networks	Lower FDI inflows and weaker international integration

Source: Author works

To complement the regional comparison presented in Table 1, Table 2 provides an evidence synthesis of country-level findings, indicating the comparative dimension, supporting evidence, source type, and analytical period. This additional evidence strengthens transparency and allows readers to trace qualitative interpretations across the selected cases.

Table 2. Evidence Synthesis of Country-Level Comparative Analysis (2018-2025)

UAE	Digital readiness, finance, innovation ecosystem	Digital government, fintech ecosystem, free zones, innovation strategies	Policy and institutional reports
Qatar	Finance, entrepreneurship support	Qatar Development Bank, startup financing, innovation programs	Institutional reports
Oman	Institutional reform, entrepreneurship development	Vision 2040 entrepreneurship and diversification programs	Policy reports
Egypt	Entrepreneurship development, digital adoption	Startup ecosystem growth and digital entrepreneurship initiatives	Academic and institutional sources
Morocco	Digital transformation, sustainability	Digital strategies and innovation reforms	Policy reports
Tunisia	Startup support and digital entrepreneurship	Startup programs and innovation initiatives	Institutional sources
Algeria	Institutional and resource constraints	Limited private-sector flexibility and financing challenges	Academic and institutional sources

Source: Author synthesis based on reviewed secondary data

5. DISCUSSION

This study examined how institutional structures, resource capacities, entrepreneurial orientation, digital transformation readiness, and ESG integration shape entrepreneurial ecosystem development in North Africa and the GCC within the ESG–Digital Nexus framework. The findings address the research questions through

Institutional Theory, RBV, and the Entrepreneurial Orientation Model, while demonstrating that the ESG–Digital Nexus provides an integrated explanation of how governance, resources, entrepreneurial behaviour, digital transformation, and sustainability jointly determine ecosystem maturity. First, regarding institutional determinants (RQ1), the findings support Institutional Theory [10]. GCC countries, supported by coordinated regulatory systems and diversification strategies such as Saudi Vision 2030 and UAE innovation agendas, demonstrate stronger entrepreneurial stability, investor confidence, ESG adoption, and digital innovation capacity. In contrast, North Africa's fragmented governance and bureaucratic inefficiencies constrain entrepreneurial development [6], weaken policy coordination, delay digital transformation, and limit ESG institutionalization. These findings indicate that institutional quality simultaneously shapes innovation capacity, sustainability adoption, and venture scalability.

Second, regarding digital transformation (RQ2), the findings support the ESG–Digital Nexus perspective. GCC ecosystems benefit from advanced digital infrastructure, AI adoption, fintech expansion, and smart innovation systems, whereas North African ecosystems remain constrained by infrastructure gaps, digital literacy deficits, and uneven technological access. The findings indicate that digital transformation contributes to ecosystem development only when supported by effective institutions, investment, and human capital.

Third, concerning resource-based explanations (RQ3), the findings strongly support RBV [31]. GCC countries benefit from sovereign wealth funds, venture capital systems, and sustainability-linked finance, confirming that resource availability supports innovation scaling [24]. By contrast, North Africa continues to rely on informal financing and donor-based support. The findings refine RBV by demonstrating that financial and technological resources create competitive advantage only when combined with institutional quality and entrepreneurial capability.

Fourth, regarding entrepreneurial orientation (RQ4), the findings partially support EOM. GCC ecosystems demonstrate stronger innovation orientation through entrepreneurship education, incubators, and structured support systems [38], whereas North Africa exhibits greater risk aversion associated with institutional and financial constraints, consistent with DeScioli [7]. Entrepreneurial orientation therefore emerges as a structurally conditioned outcome influenced by governance quality, access to finance, and digital exposure rather than culture alone [12]. Finally, the findings extend the ESG–Digital Nexus by showing that digital transformation and ESG integration operate as mutually reinforcing mechanisms rather than independent ecosystem drivers. Digital technologies—including AI, fintech, blockchain, and data systems—improve transparency, efficiency, and sustainable innovation, thereby strengthening ESG implementation. Conversely, ESG governance directs digital transformation toward responsible entrepreneurship, green innovation, and long-term value creation. Ecosystem maturity therefore depends on aligning governance, resources, entrepreneurial orientation, digital capabilities, and ESG governance rather than emphasizing any single dimension.

6. THEORETICAL CONTRIBUTIONS, IMPLICATIONS, AND RECOMMENDATIONS

This study makes an original theoretical contribution by integrating five interconnected dimensions of entrepreneurial ecosystem development—institutional quality, resource capacity, entrepreneurial behaviour, digital transformation, and ESG governance—within a single ESG–Digital Nexus framework. Unlike previous studies that examine these factors independently, the findings demonstrate that ecosystem maturity results from their interaction rather than isolated effects. The study extends Institutional Theory by showing that governance quality shapes both digital transformation and ESG institutionalization. It refines RBV by demonstrating that resources generate competitive advantage only when supported by effective institutions and entrepreneurial capability. It also reconceptualizes Entrepreneurial Orientation as an outcome influenced by institutional and resource conditions, while the ESG–Digital Nexus explains how digital transformation enables ESG implementation and how ESG governance guides digital innovation toward sustainable entrepreneurial outcomes.

The findings have important implications for policymakers and ecosystem stakeholders. Because the empirical results reveal different structural constraints across the two regions, policy priorities should reflect regional conditions rather than adopt a uniform approach. For North African countries, where fragmented governance and weak policy coordination constrain ecosystem development, institutional reforms should simplify regulations, strengthen transparency, integrate ESG and digital governance into entrepreneurship policies, and improve policy coordination. For GCC countries, where institutional systems are comparatively stronger, priorities should focus on strengthening ESG implementation and extending digital opportunities beyond major innovation hubs [59].

The findings also indicate clear regional differences in entrepreneurial finance. GCC ecosystems benefit from sovereign wealth funds, venture capital, and green finance [60], whereas North African ecosystems remain constrained by limited formal financing and dependence on informal funding. Accordingly, North African governments should expand venture capital markets, public–private financing mechanisms, and startup investment platforms, while GCC countries should continue strengthening sustainability-linked finance and innovation investment.

Digital transformation should likewise reflect empirical findings. North African countries should prioritize broadband infrastructure, digital literacy, AI capability, and innovation hubs to address identified digital readiness gaps. GCC countries should focus on ensuring inclusive digital access and strengthening the integration of digital transformation with ESG-oriented entrepreneurship. Finally, the findings demonstrate that entrepreneurial orientation is strengthened through education, incubation, and innovation support. Accordingly, entrepreneurship education should integrate innovation, digital skills, and ESG principles to encourage sustainable venture creation, particularly in North Africa where institutional support and innovation exposure remain comparatively weaker. Cross-regional collaboration through joint incubators, knowledge-sharing platforms, and regional investment networks would further reduce disparities and strengthen entrepreneurial ecosystem development across the MENA region.

7. CONCLUSION

This study examined entrepreneurial ecosystem development across eight selected countries in North Africa (Egypt, Morocco, Tunisia, and Algeria) and the Gulf Cooperation Council (GCC) (Saudi Arabia, the United Arab Emirates, Qatar, and Oman) through an integrated ESG–Digital Nexus framework, drawing on Institutional Theory, the Resource-Based View, and the Entrepreneurial Orientation Model. Using a qualitative descriptive comparative analysis of secondary literature and institutional evidence published between 2018 and 2025, the findings reveal regional disparities in institutional quality, digital readiness, financial access, entrepreneurial orientation, and ESG integration. GCC countries show more mature ecosystems supported by strong governance, advanced digital infrastructure, and developed financial systems, while North Africa faces institutional fragmentation, limited finance, uneven digital development, and weaker ESG institutionalization.

Overall, ecosystem performance depends on the interaction of institutions, resources, digital capabilities, entrepreneurial behavior, and sustainability governance rather than economic resources alone. The ESG–Digital Nexus highlights that ecosystem maturity emerges from systemic alignment across these dimensions. The study further demonstrates that institutional quality, resource availability, entrepreneurial orientation, digital transformation, and ESG integration should be understood as an interconnected ecosystem rather than as independent determinants of entrepreneurial development. The study uses secondary qualitative data, which limits real-time accuracy, firm-level insight, and cross-country comparability, suggesting caution in generalization. Future research should adopt mixed methods, longitudinal designs, and firm-level analysis to empirically test and deepen the framework across a broader range of MENA countries and emerging economies. Strengthening ecosystems requires coordinated progress in governance, digital infrastructure, finance, and sustainability to enhance inclusive and resilient economic transformation.

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