

Digital Transformation and Entrepreneurial Dynamics in the Maghreb Region: Towards Smart and Competitive Ecosystems

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Abstract:

Digital transformation is rapidly reshaping business practices in the Maghreb region. Algeria, Morocco, and Tunisia are adopting digital platforms, data analytics, fintech, and intelligent systems at different rates, thereby influencing business growth, competition, and value creation. This study investigates the role of digital transformation in fostering entrepreneurial growth and competitiveness. Employing a comparative approach, it assesses the impact of digital innovation on business models, knowledge management, and smart work environments across organizations at varying stages of digital adoption. The findings indicate that, despite disparities in digital development, Maghreb countries face common challenges, including limited digital skills, legislative constraints, and restricted access to financing. Nevertheless, digital transformation offers substantial opportunities for startups and SMEs to improve productivity, broaden market reach, and strengthen competitiveness. The study demonstrates that digital transformation constitutes a strategic process that enhances organizational agility and innovation. It underscores the necessity for integrated digital ecosystems, shaped by coherent policies and collaborative efforts.

Keywords: Digital Transformation, Entrepreneurial Growth, Maghreb Region, Knowledge Management, Digital Innovation.

I- Introduction:

In recent years, the global economic landscape has undergone significant change due to rapid advances in digital technology. The increasing integration of digital transformation within the business sector is evident (Huang & Gao, 2026). Organizations are adopting digital tools to enhance performance and generate new value. This transition is reshaping the concept of competitiveness in both developed and emerging economies (Maaitah, 2023). In this context, digital transformation is regarded as a strategic imperative rather than a mere technological upgrade, with a substantial impact on organizational agility and sustainability.

In emerging economies, the Maghreb region, comprising Algeria, Morocco, and Tunisia, has initiated a gradual process of digital transformation. These countries are developing information and communication technologies (ICT) and expanding digital platforms and data-driven strategies. Despite sharing similar socio-economic characteristics, they exhibit varying degrees of digital maturity and institutional preparedness, resulting in diverse digital transformation trajectories. Nevertheless, digital transformation presents significant opportunities for entrepreneurial development, particularly for startups and small and medium-sized enterprises (SMEs), thereby promoting economic diversification and job creation.

Entrepreneurship in the Maghreb region is significantly shaped by digital transformation. The adoption of digital technologies enables entrepreneurs to address structural barriers inherent in traditional economies, such as limited market access, resource constraints, decision-making processes, and customer

engagement. Furthermore, digital transformation is associated with the emergence of smart work environments characterized by flexibility and knowledge-driven practices.

This research seeks to address this gap by analyzing the interactions among digital transformation, knowledge management, and entrepreneurship within the Maghreb's entrepreneurial ecosystems. The specific objectives are: to identify the principal interactions between digital transformation, knowledge management, and entrepreneurship in the Maghreb; to compare these interactions within the region's socio-economic context; and to assess the extent to which existing frameworks address these themes in emerging regional ecosystems.

This study aims to elucidate the role of digital transformation as a strategic facilitator of entrepreneurship in the Maghreb. Employing a conceptual methodology, the objectives include assessing the impact of digital transformation on business model innovation and knowledge management, analyzing its influence on smart and adaptive environments, and identifying key enabling factors within the regional context.

This study contributes to the field of digital entrepreneurship by providing a regional perspective on the Maghreb. It develops a framework that links digital transformation to knowledge-based entrepreneurship and offers policy implications for fostering smart, competitive environments in emerging economies.

1. The theoretical framework of the study.

Digital transformation enhances business models and competitiveness by integrating digital technologies, necessitating cultural change and management skills. It increases operational efficiency and entrepreneurship through big data analytics, fostering job creation and innovation. In the Maghreb, institutional structures and infrastructure influence progress. Digital technology enhances productivity and competitiveness in knowledge-driven ecosystems, improving organizational performance and fostering collaborative environments for market adaptation.

1.1 Conceptualizing Digital Transformation and Digital Innovation

Digital transformation means integrating digital technologies into organizational processes, structures, and strategies to create value and enhance competitiveness. It goes beyond adopting digital tools. It is a deep change in business models and capabilities (Ciriello et al., 2018). Digital innovation is a core part of digital transformation. It enables new value through technologies such as AI, cloud computing, big data analytics, and IoT (Verhoef et al., 2021).

Recent research shows that digital transformation is multidimensional. It covers technological, organizational, and strategic aspects (Shen et al., 2021). Organizations that integrate digital technologies into their core models tend to be agile, innovative, and responsive to the market. However, digital transformation is complex. Success requires cultural change, management skills, and learning. All of these are challenges for organizations, especially in emerging economies (Felicetti et al., 2024).

1.2 Entrepreneurship and Economic Development in Emerging Contexts

Entrepreneurship is a catalyst for economic development, innovation, and job creation. In emerging economies, it supports economic diversification and reduces reliance on established industries (Maaitah, 2023). Small and medium-sized firms are seen as catalysts for growth in regions like the Maghreb. These firms boost economic growth and provide jobs.

Entrepreneurial performance is significantly influenced by environmental factors such as access to financing and technology (Zhao, 2005). The integration of digital tools in entrepreneurship is essential. It enhances organizational efficiency and facilitates access to new prospects. In this regard, digital entrepreneurship might be seen as a hybrid concept encompassing innovation, technology adoption, and opportunity recognition.

1.3 Digital Transformation and Entrepreneurial Dynamics

The correlation between digital transformation and entrepreneurship has garnered significant attention in contemporary literature. In this context, digital technologies are seen as catalysts that empower entrepreneurs. They help entrepreneurs discern opportunities, develop, and enhance their operations more efficiently (Kreiterling, 2023). For example, big data analytics and digital platforms help elucidate market patterns and consumer behavior. This is essential for guiding a firm's decision-making process.

Furthermore, digital transformation is essential for improving knowledge management processes within enterprises. It enables companies to gather and store knowledge using digital tools (Anshari et al., 2023). In this instance, companies might utilize this principle to innovate and enhance their performance. Moreover, digital technologies such as collaborative and virtual platforms can facilitate contact and knowledge dissemination. This fosters innovation and creativity in entrepreneurship (Kraus et al., 2023).

From a corporate standpoint, digital transformation is a pivotal concept. It enables enterprises to enter global markets through e-commerce and online marketing (Belghanami, 2022). Digital tools can enable startups and small to medium-sized firms to penetrate new markets and compete globally. In this regard, digital transformation is not just a concept for enhancing a firm's efficiency. It can also be seen as a mechanism for altering its competitive landscape.

1.4 Digital Transformation in the Maghreb Context

Digital transformation in the Maghreb region is progressing at varying speeds across countries. This reflects differences in institutional frameworks, infrastructure development, and governmental support. Morocco and Tunisia have made considerable progress in developing their digital ecosystems. They have supported startups, digital services, and innovation legislation. Algeria is incrementally enhancing its digital infrastructure and entrepreneurial initiatives.

Notwithstanding these advancements, considerable structural challenges persist throughout the region. These include limited digital competencies, inadequate financial resources, and legislative ambiguity. The challenges are especially clear in areas like e-commerce, fintech, and data governance (Asma et al., 2024). Moreover, the absence of strong integration among universities, research institutes, and businesses hinders information transfer and the diffusion of innovation.

However, emerging research indicates that Maghreb firms that use digital technology are more adept at enhancing productivity, improving consumer interaction, and developing innovative business strategies. Digital transformation offers the region a strategic opportunity to establish competitive, knowledge-driven entrepreneurial ecosystems.

1.5 Knowledge Management and Smart Work Environments

Literature increasingly demonstrates a robust correlation between digital transformation and knowledge management. Organizations are using digital technology to enhance knowledge management and optimize performance (Anshari et al., 2023). In this setting, knowledge management is essential. It can enhance innovation and organizational success.

Moreover, digital transformation significantly contributes to the creation of smart work environments defined by flexibility, collaboration, and data utilization. Such workspaces utilize digital technology such as cloud computing, collaboration tools, and artificial intelligence to enhance efficiency and creativity (Kraus et al., 2023). For entrepreneurial enterprises, these work environments are crucial for adjusting to evolving market conditions.

1.6 Synthesis and Theoretical Framework

The literature evaluation indicates a robust interconnection among digital transformation, knowledge management, and entrepreneurial growth. Nonetheless, most current research has been conducted in affluent nations, with insufficient attention to emerging regional contexts such as the Maghreb. Furthermore, there are limited integrative methodologies for examining digital transformation, knowledge management, and entrepreneurial growth within a cohesive framework.

This study uses the aforementioned findings to establish a conceptual framework that connects digital transformation to entrepreneurial growth through knowledge management in the context of intelligent work environments. The study focuses on the Maghreb region to bridge the divide between global theoretical advances and regional particularities.

2. Digital Transformation and Entrepreneurial Growth: An Analytical Perspective

Digital transformation plays a pivotal role in reshaping entrepreneurial processes and outcomes, especially in emerging, resource-limited contexts such as the Maghreb. The relationship between digital

transformation and entrepreneurial growth is mediated by several processes, such as knowledge management techniques and organizational flexibility, rather than being direct and linear.

2.1 Digital Transformation as a Driver of Entrepreneurial Capabilities

The concept of digital transformation profoundly enhances entrepreneurial capacities by providing firms with dynamic, knowledge-driven methodologies. In contrast to a direct, linear correlation between digital transformation and entrepreneurial success, this notion empowers businesses to identify and capitalize on market opportunities. These talents are essential in emerging economies such as the Maghreb region, especially in contexts marked by institutional and environmental challenges that require significant flexibility and reactivity.

From an entrepreneurial perspective, digital transformation enables organizations to recognize opportunities by leveraging data and information accessible through tools such as data analytics and digital platforms. These tools are critical in enabling organizations to identify emerging trends and meet customer needs through innovation and strategic decision-making (Kreiterling, 2023). In this context, digital transformation enables organizations to develop entrepreneurial agility, which is critical for enhancing competitiveness in dynamic, changing environments.

2.2 Knowledge Management as a Mediating Mechanism

Digital transformation is poised to influence entrepreneurial growth significantly through knowledge management. Digital technologies play a crucial role in the creation, storage, sharing, and utilization of knowledge within an organization, significantly enhancing learning processes (Jędrzejczyk, 2025). Knowledge is a crucial intangible asset for startups and small- to medium-sized enterprises (SMEs).

In this context, knowledge management serves as a mediating factor between digital transformation and entrepreneurial performance. The use of digital tools, including cloud computing, collaboration platforms, and AI-driven analytics, has enabled greater knowledge exchange among enterprises. These technologies have enabled firms to augment problem-solving capabilities, refine innovation processes, and improve decision-making.

Furthermore, in the Maghreb region, where access to formal knowledge resources is constrained, digital tools are essential in closing knowledge gaps. The tools have facilitated connections by giving entrepreneurs access to global networks. It is essential to understand how digital transformation integrates with knowledge management practices to enhance entrepreneurial success.

2.3 Smart Work Environments and Organizational Adaptability

Digital transformation is expected to facilitate the creation of intelligent work environments within enterprises. These environments are defined by organizational flexibility, cooperation, and data-informed decision-making. The surroundings depend on several digital instruments, including remote work applications, real-time communication platforms, and project management software (Kraus et al., 2023).

From an analytical standpoint, intelligent work environments can be regarded as an organizational characteristic stemming from digital transformation. The attribute is defined by the integration of technical capabilities into organizational activities. The settings have enabled enterprises to enhance efficiency and agility through collaborative processes.

In the realm of entrepreneurial enterprises, particularly in the Maghreb, adopting intelligent work practices enables organizations to operate with constrained resources while achieving greater efficiency and adaptability. This is particularly pertinent in contexts characterized by uncertainty.

2.4 Market Expansion and Competitive Positioning

The latter phase of digital transformation concerns its impact on market expansion and competitive positioning. In this context, it is essential to recognize that digital technologies enable firms to surpass geographical limitations and reach broader markets through electronic commerce platforms, digital marketing initiatives, and online consumer engagement tools (Belghanami, 2022).

From a strategic management viewpoint, it is crucial to recognize that digital transformation empowers firms to refine their personalization initiatives, optimize pricing strategies, and improve customer

experience. This not only enhances customer interactions for firms but also fosters the establishment of durable competitive advantages.

In this perspective, it is crucial to acknowledge that organizations in the Maghreb region can leverage traditional market systems. Consequently, digital transformation can enhance market accessibility for startups and SMEs in this context. This would further strengthen the connection between digital transformation and entrepreneurial development.

2.5 Linking Digital Transformation to Entrepreneurial Growth

Building on earlier research, this study presents a conceptual framework for understanding how digital transformation affects entrepreneurial growth and competitiveness in the Maghreb region. Rather than assuming a direct relationship, the concept takes a systemic approach, in which the impact of digital transformation is mediated by knowledge-based and organizational mechanisms and is influenced by contextual factors.

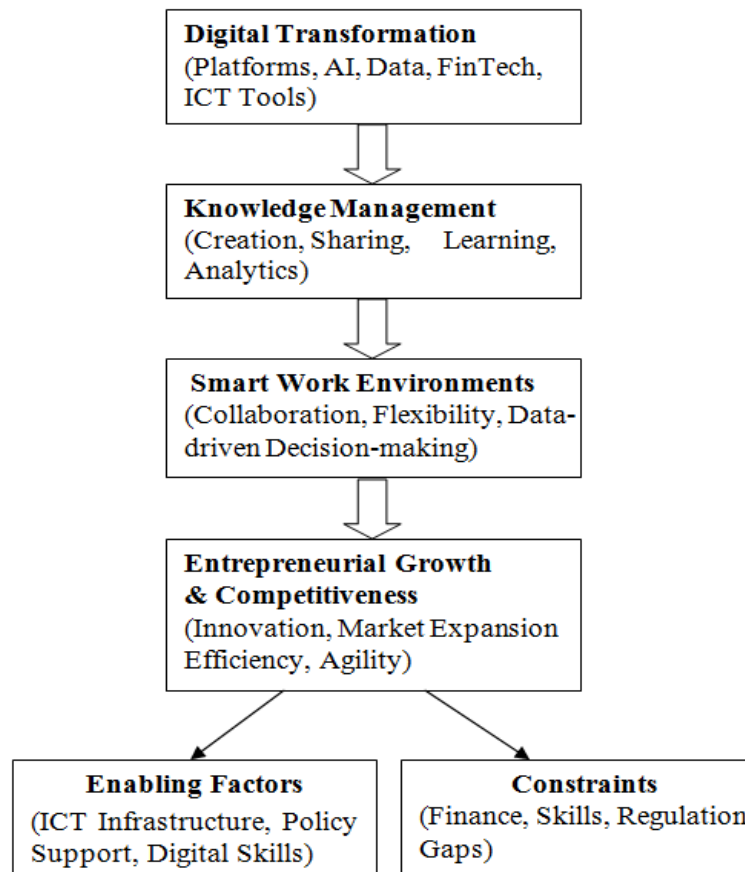
Digital transformation serves as the primary catalyst, enabling enterprises to leverage technologies such as digital platforms, artificial intelligence, data analytics, and fintech solutions to enhance innovation and decision-making capabilities (Nambisan et al., 2017; Hund et al., 2021). Nonetheless, their effects are postponed and mitigated by knowledge management, which facilitates the creation, dissemination, and use of information within organizations, thereby fostering learning and innovation processes (Anshari et al., 2023).

Consequently, these techniques facilitate the establishment of intelligent work environments characterized by flexibility, collaboration, and data-informed decision-making, thereby enhancing organizational adaptability and efficiency (Kraus et al., 2023). Collectively, these elements foster entrepreneurial development and competitiveness, as demonstrated by enhanced innovative capabilities, market growth, and operational efficacy (Shen et al., 2022; Audretsch et al., 2021).

The framework considers the influence of enabling factors—such as ICT infrastructure, policy support, and digital skills—alongside constraints—including financial limitations, regulatory obstacles, and skills deficiencies—on the efficacy of digital transformation (Asma et al., 2024).

Figure 1 demonstrates that digital transformation influences entrepreneurial success via a mediated, multi-dimensional process that encompasses knowledge management and intelligent work environments, while being influenced by facilitating factors and structural limitations.

Figure (1): Conceptual Framework Linking Digital Transformation and Entrepreneurial Growth



Source: Developed by the authors based on Nambisan et al. (2017); Hund et al. (2021); Anshari et al. (2023); Kraus et al. (2023); Kreiterling (2023).

2.6 Theoretical Implications

This approach highlights that digital transformation does not immediately lead to entrepreneurial success; rather, its impact is mediated by knowledge processes and organizational practices. This perspective enriches the literature by going beyond linear interpretations and emphasizing the systemic and multifaceted nature of digital transformation.

Furthermore, by situating this paradigm within the Maghreb, the study clarifies the complex ways in which regional characteristics shape the effectiveness of digital transformation. It demonstrates that digital projects can succeed only when individuals use the technology and when supportive ecosystems and organizational competencies are established.

3. The experimental framework: Digital Transformation and Entrepreneurial Dynamics in the Maghreb Region

The digital revolution in the Maghreb reveals entrepreneurial disparities among Algeria, Morocco, and Tunisia. Demonstrating a robust entrepreneurship ecosystem. Digital technologies are progressively utilized to foster entrepreneurial expansion, as platformization transforms business models for scalable ecosystems.

3.1. Digital Transformation Trajectories in the Maghreb

This section provides a comprehensive analysis of the impact of digital transformation on entrepreneurial activities in the Maghreb region, complementing the conceptual framework. Rather than just detailing individual cases, the emphasis is on a comparative approach that aims to reveal structural trends, sectoral dynamics, and the unique trajectories of Algeria, Morocco, and Tunisia.

The three nations exhibit differing levels of digital advancement and ecosystem development. Morocco distinguishes itself as a regional leader, supported by initiatives such as Morocco Digital 2025, which have

catalyzed the development of digital infrastructure, the growth of startup ecosystems, and the implementation of innovation-centric policies. Tunisia possesses a comparatively developed entrepreneurial ecosystem, substantially supported by the Startup Act, which has enhanced access to capital, alleviated regulatory barriers, and promoted the international growth of startups. Concurrently, Algeria is undergoing a gradual digital transformation, marked by recent initiatives to bolster institutional support for startups, enhance digital infrastructure, and promote innovation endeavors.

Despite existing disparities, a discernible trend emerges across all three nations: an increasing reliance on digital technologies as a fundamental instrument for promoting entrepreneurial advancement. This trend reflects a broader regional shift towards digital transformation aimed at enhancing competitiveness, fostering innovation, and strengthening the development of more resilient entrepreneurial ecosystems.

3.2 Platformization and Business Model Transformation

A significant indicator of digital transformation in the Maghreb is the proliferation of platform-based business models, which alter how enterprises generate value, engage customers, and communicate with them. These platforms facilitate the transition from conventional linear value chains to scalable, network-oriented ecosystems, wherein digital interactions and data flows collaboratively generate value.

Yassir, a prominent ride-hailing and super-app platform in Algeria, exemplifies this transformation. Yassir has expanded its offerings beyond transportation to encompass food delivery and banking services through the integration of geolocation technologies, mobile applications, and digital payment systems. This illustrates how digital platforms can expand and provide other services. The emergence of Jumia Morocco, within the broader African e-commerce framework, alongside local platforms like Hmizate, has facilitated the digitization of commercial operations for SMEs, granting them access to new markets and the ability to adopt data-driven retail strategies. In Tunisia, platforms such as Expensya, a global SaaS-based expense management solution, and Dabchy, a peer-to-peer fashion marketplace, exemplify how digital platforms can facilitate local market integration and the export of global services (Ferdj, 2024).

These instances illustrate how platformization enhances entrepreneurial scalability by reducing transaction costs, optimizing resource allocation, and enabling real-time data use (Sun et al., 2023). Furthermore, they illustrate how digital platforms confer novel forms of competitive advantage through network effects, customer engagement, and perpetual innovation, thereby strengthening the positions of Maghreb entrepreneurs in both regional and global markets.

The emergence of platform-based business models in the Maghreb is a vital aspect of digital transformation, as they transform value creation and market engagement. These platforms enable enterprises to shift from outdated linear models to more scalable, network-oriented designs.

3.3 Fintech Ecosystems and Financial Inclusion

Digital transformation has accelerated the expansion of fintech ecosystems, which significantly enhance entrepreneurial activity by improving access to financial resources.

The emergence of mobile payment solutions and digital banking services in Morocco, facilitated by legislative reforms, has enhanced financial inclusion and streamlined corporate transactions. Tunisia has seen the expansion of fintech firms leveraging digital payment systems and blockchain solutions, supported by a conducive regulatory environment. In Algeria, applications such as BaridiMob and the expansion of digital financial services indicate a steady shift towards digital finance; yet, usage remains constrained relative to neighboring countries (World Bank, 2022).

These trends emphasize fintech's role as both an enabler of entrepreneurship and a structural component of digital ecosystems, reducing financial barriers and enabling business scalability (Gomber et al. 2018).

3.4 Knowledge-Driven Innovation and Organizational Transformation

Empirical evidence substantiates the proposed conceptual framework, demonstrating that digital transformation in the Maghreb is directly correlated with the advancement of knowledge-based capabilities and organizational innovation.

Startups and SMEs in the region are swiftly adopting digital technologies to enhance their knowledge management processes, including cloud computing, collaboration platforms, and data analytics. In

Tunisia, digital startups in the IT and outsourced sectors leverage global knowledge networks and digital collaboration technology to deliver services internationally. In Morocco, innovation centers and incubators facilitate the sharing of information and the processes of entrepreneurial education. In Algeria, emerging digital communities and company incubators are starting to fulfill a comparable function, albeit at a nascent phase. These practices foster intelligent work environments where flexibility, real-time communication, and data-driven decision-making are essential to organizational success.

3.5 Sectoral Innovation: Health, Education, and Services

Digital transformation is progressively reshaping traditional industries in the Maghreb by integrating innovative technologies and data-driven approaches beyond core digital sectors. This alteration signifies the extensive dissemination of digital innovation from technology-driven companies to conventional economic sectors.

Telemedicine platforms and digital health solutions have gained prominence, especially in Tunisia and Morocco (Iyawa et al., 2019). Tunisian technologies, as demonstrated by Med.tn, facilitate online medical appointments and digital patient management, whereas Moroccan telehealth projects proliferated during the COVID-19 pandemic, improving access to healthcare services and optimizing resource allocation. E-learning platforms have gained significant momentum in the region, especially in Tunisia, where digital education startups and platforms like GoMyCode provide instruction in coding and digital skills, hence enhancing human capital development.

Small and medium-sized enterprises (SMEs) in the service and industrial sectors are progressively using enterprise resource planning (ERP) systems, customer relationship management (CRM) tools, and automation technologies to enhance operational efficiency and competitiveness. In Morocco, SMEs in manufacturing and logistics have adopted digital supply chain management systems to enhance productivity, whereas in Algeria, enterprises are increasingly using digital management tools and cloud-based solutions to modernize their operations.

These sectoral advancements indicate that digital innovation extends beyond high-tech businesses and is progressively assimilating into the broader economic landscape. Furthermore, they illustrate how digital transformation enhances efficiency, improves service delivery, and creates new value propositions in traditional sectors, thus bolstering the overall competitiveness of the Maghreb's entrepreneurial ecosystem.

3.6 Cross-Regional Patterns and Theoretical Implications

A comparative analysis of the Maghreb region reveals some recurring patterns that validate the conceptual framework defined in this study:

- Digital transformation fosters innovation in business models, particularly via platformization.
- Knowledge management strategies facilitate the conversion of digital capabilities into innovative results.
- Smart work environments enhance organizational adaptability and efficiency.
- Digital tools facilitate market expansion and internationalization.

Simultaneously, cross-national disparities underscore the importance of institutional and structural factors. Morocco and Tunisia possess more developed digital ecosystems and robust legal frameworks, whilst Algeria faces structural challenges but holds greater potential for growth driven by digital advancements.

3.7 From Digital Adoption to Ecosystem Development

Empirical research indicates that digital transformation in the Maghreb is evolving from fragmented technical adoption to the establishment of cohesive entrepreneurial ecosystems. The effectiveness of this change depends on the alignment of technology capabilities, organizational practices, and institutional support.

This highlights the study's primary assertion: digital transformation fosters entrepreneurial growth via mediated processes such as knowledge management and organizational innovation, which are shaped by facilitating factors and structural constraints.

4. Enabling Factors and Structural Constraints of Digital Transformation in the Maghreb.

The digital transformation in the Maghreb is driven by improved ICT infrastructure, alongside human capital development through coding academies. However, challenges including inadequate digital skills, financial constraints, and regulatory barriers hinder progress. Additionally, resistance to change and fragmented initiatives deter transformation. A coordinated regional strategy is crucial to foster entrepreneurship and create a cohesive digital marketplace.

4.1 Enabling Conditions for Digital Transformation

The effectiveness of digital transformation in fostering entrepreneurial growth in the Maghreb relies on several interrelated enabling factors at the technological, institutional, and human levels. These attributes influence businesses' capacity to adopt, integrate, and leverage digital technology effectively and sustainably.

The proliferation of information and communication technologies (ICT)—including broadband access, mobile penetration, and cloud services—is an essential prerequisite for digital transformation at the infrastructure level. Countries like Morocco have achieved significant advancements by executing national programs to enhance digital infrastructure and connectivity, facilitating the creation of digital platforms and services. Nonetheless, disparities remain across the region, especially in Algeria, where infrastructure development, although progressing, remains inconsistent.

At the institutional level, political policies and regulatory frameworks significantly support digital ecosystems. Tunisia's Startup Act has created a conducive legal environment by reducing administrative obstacles, enhancing financial accessibility, and promoting innovation-oriented business. Likewise, Morocco's digital initiatives have fostered public-private partnerships and investment in digital sectors. These initiatives illustrate how integrated policy frameworks can act as catalysts for digital transformation (Verhoef et al., 2021).

Human capital is an essential facilitating element. The presence of digital skills and entrepreneurial capabilities affects a business's capacity to use digital technologies efficiently. In this context, regional efforts such as coding academies, digital training programs, and innovation hubs—especially in Tunisia and Morocco—have strengthened the talent pool. However, aligning educational institutions with market demands is a persistent challenge (Kraus et al., 2023).

Ultimately, collaborative networks and innovation ecosystems, including incubators, accelerators, and research institutes, are pivotal in facilitating information flow and fostering entrepreneurial development. These networks provide enterprises with access to resources, mentorship, and international marketplaces, enhancing the effects of digital transformation.

4.2. Key Challenges of Digital Transformation in the Maghreb

Despite these promising conditions, digital transformation in the Maghreb is hampered by several structural and systemic impediments that undermine its effectiveness and scalability.

One of the most pressing issues is the digital skills gap, which impacts both technical and administrative capabilities. Many businesses, particularly SMEs, lack the knowledge to integrate advanced digital solutions or to fully leverage data-driven decision-making. This limitation is particularly acute in Algeria, although it applies throughout the area.

Another significant impediment is limited access to capital, particularly for businesses looking to invest in digital technology or expand their operations. Although Tunisia and Morocco have made strides in creating venture capital ecosystems, investment options remain limited when compared to global standards. In Algeria, institutional and regulatory hurdles make it even more difficult to obtain funding.

Regulatory and institutional constraints are also significant barriers. While progress has been made in areas such as digital entrepreneurship and fintech legislation, concerns about data protection, electronic transactions, and digital governance continue to undermine investor trust and delay the uptake of innovation (Asma et al., 2024). These legal inadequacies cause fragmentation in the digital economy and hinder cross-border integration in the Maghreb.

Furthermore, organizational and cultural resistance to change remains an understudied yet essential barrier. Many businesses use traditional management structures that may not fully enable innovation, information sharing, or digital experimentation. This inhibits the ability of organizations.

4.3 A Critical Perspective: From Technology Adoption to Ecosystem Transformation

A comprehensive examination of the Maghreb environment reveals that digital transformation cannot be limited to the simple adoption of technologies. Rather, its effectiveness is dependent on the alignment of technological capabilities, organizational practices, and institutional frameworks.

In some instances, digital initiatives in the region are disjointed and reactive, emphasizing immediate technological enhancements above enduring strategic transformation. This hampers their capacity to foster entrepreneurial development and establish enduring competitive advantages. Successful digital transformation requires a holistic approach that integrates strategy, culture, and competencies, as the research indicates.

Moreover, the absence of regional integration in the Maghreb constitutes a squandered opportunity. Notwithstanding shared economic and cultural characteristics, cross-border digital collaboration is constrained, hindering the formation of a cohesive digital market with enhanced scalability and competitiveness.

5. Strategic and Policy Recommendations

Addressing the structural difficulties identified in the Maghreb requires a collaborative, multi-level approach that involves both politicians and corporate actors. Rather than relying on standalone actions, successful digital transformation requires integrating infrastructure, legal frameworks, financial systems, and organizational capabilities. In this sense, the following strategic directions arise.

5.1. From a policy perspective

Policymakers persist in prioritizing the enhancement of digital infrastructure. Maroc Digital 2025 illustrates how sustained investment in broadband connectivity and digital public services may foster ecosystem development. Similar large-scale activities are required in Algeria to address regional inequities and promote digital inclusion.

Establishing flexible, cohesive regulatory frameworks is equally essential for fostering innovation while ensuring market stability. Tunisia's Startup Act serves as an effective benchmark by streamlining administrative processes, expanding access to finance, and promoting the internationalization of startups. Implementing analogous regulatory frameworks across the Maghreb, particularly in fintech, e-commerce, and data governance, would enhance entrepreneurial engagement and bolster investor confidence.

Access to funding is an essential instrument for digital transformation. Although Morocco and Tunisia have advanced in venture capital development and governmental funding strategies, financial constraints continue to pose a substantial obstacle in Algeria. Establishing specialized digital innovation funds, alongside public-private investment initiatives, would facilitate startup expansion and accelerate technological adoption.

Enhancing regional digital integration is essential for realizing the Maghreb's complete potential. Despite geographical proximity and economic commonalities, cross-border digital collaboration remains constrained. Establishing a cohesive regional digital market to enhance data flows, digital commerce, and startup mobility will augment scalability, competitiveness, and global standing.

5.2. From a managerial perspective

At the organizational level, businesses must transition from viewing digital transformation as merely a technological enhancement to integrating it into their core strategy. Successful cases, such as Yassir in Algeria and Expensya in Tunisia, demonstrate that integrating digital technologies into business models enhances scalability and diversity.

Investing in digital competencies and ongoing development is equally significant. Initiatives such as GoMyCode in Tunisia illustrate the significance of private-sector-led training programs in bridging the skills gap and enhancing entrepreneurial ecosystems. Companies in the Maghreb want to implement such measures to enhance workforce competencies and innovation potential.

Moreover, fostering an innovation-centric organizational culture is essential to maximizing the benefits of digital transformation. This encompasses fostering experimentation, promoting information interchange,

and employing agile management methodologies. Organizations that undergo cultural transformations are better at managing technological change and market volatility.

Ultimately, firms should actively participate in collaborative networks, such as incubators, accelerators, and international alliances. Startups in Morocco and Tunisia have gained access to global markets and knowledge networks through involvement in innovation centers. Expanding collaborative methods throughout the Maghreb would boost the region's overall innovation capacity.

Conclusion

This study examined the impact of digital transformation on entrepreneurial dynamics in the Maghreb region, specifically in Algeria, Morocco, and Tunisia. The findings indicate that digital transformation serves as a strategic catalyst for growth, extending beyond technical adoption to influence organizational skills, knowledge processes, and market positioning.

The analysis reveals that the impact of digital transformation is neither direct nor uniform; instead, it transpires through a mediated process involving knowledge management and the establishment of smart work environments. These strategies enable businesses to enhance their innovative potential, operational efficiency, and market reach, thereby augmenting their overall competitiveness. Digital transformation should be regarded as a systemic, capability-oriented process rather than a mere technological shift.

However, the analysis indicates that the efficacy of digital transformation remains obstructed by enduring structural impediments, including deficiencies in digital skills, restricted access to financing, regulatory ambiguity, and disjointed innovation ecosystems. These constraints underscore the need for a more cohesive, synchronized strategy that harmonizes technological implementation, institutional development, and organizational readiness.

This study contributes to the literature by providing a region-specific perspective on digital entrepreneurship in the Maghreb and introducing a comprehensive conceptual framework that links digital transformation, knowledge management, and entrepreneurial success. It also offers valuable insights for politicians and corporate leaders seeking to foster intelligent, competitive ecosystems.

Future research should concentrate on experimentally validating the proposed framework, examining sector-specific dynamics, and evaluating the long-term impact of emerging technologies, such as artificial intelligence, on the region's entrepreneurial ecosystems.

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