

Territorial Entrepreneurial Ecosystems and Digital Start-up Development: A Qualitative Study of Opportunities and Constraints in the Dakhla-Oued Eddahab Region

**Les écosystèmes entrepreneuriaux territoriaux et le développement des
start-ups numériques : une étude qualitative des opportunités et des
contraintes dans la région de Dakhla-Oued Eddahab**

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Abstract

Digital entrepreneurship has become a key driver of innovation and regional economic transformation, particularly in emerging territories where entrepreneurial ecosystems are still evolving. This study investigates how the territorial entrepreneurial ecosystem shapes the development of digital start-ups in the Dakhla-Oued Eddahab region. Adopting a qualitative case study approach, the research is based on semi-structured interviews conducted with ten actors of the entrepreneurial ecosystem, including start-up founders, digital entrepreneurs, and institutional stakeholders. Thematic analysis was used to examine digital practices, innovation processes, territorial opportunities, and development constraints. The findings reveal that digital technologies enhance market access, foster business model innovation, and enable entrepreneurs to develop solutions tailored to local needs. Nevertheless, limited access to finance, insufficient digital skills, and infrastructural deficiencies remain major barriers. To address these challenges, start-ups implement adaptive and frugal innovation strategies that strengthen their resilience and sustainability. The study contributes to the literature by highlighting how territorial entrepreneurial ecosystems influence digital entrepreneurship and innovation dynamics in peripheral and emerging regions.

Keywords: Digital Entrepreneurship; Entrepreneurial ecosystem; Digital start-ups; Frugal innovation; Territorial constraints.

Résumé

L'entrepreneuriat numérique constitue aujourd'hui un levier majeur d'innovation et de transformation économique, notamment dans les territoires émergents où les écosystèmes entrepreneuriaux sont en cours de structuration. Cette recherche analyse la manière dont l'écosystème entrepreneurial territorial influence le développement des start-ups numériques dans la région de Dakhla-Oued Eddahab. L'étude adopte une approche qualitative fondée sur une étude de cas et s'appuie sur des entretiens semi-directifs réalisés auprès de dix acteurs de l'écosystème entrepreneurial, comprenant des fondateurs de start-ups, des entrepreneurs numériques et des acteurs institutionnels. Les données ont été analysées à l'aide d'une analyse thématique portant sur les pratiques numériques, les processus d'innovation, les opportunités offertes par le territoire et les contraintes rencontrées. Les résultats mettent en évidence le rôle du numérique dans l'amélioration de l'accès au marché, l'innovation des modèles d'affaires et le développement de solutions adaptées aux besoins locaux. Ils montrent également que les contraintes liées au financement, aux compétences numériques et aux infrastructures conduisent les entrepreneurs à développer des stratégies d'adaptation fondées sur l'innovation frugale. Sur le plan scientifique, cette recherche enrichit la compréhension des interactions entre les écosystèmes entrepreneuriaux territoriaux, l'entrepreneuriat numérique et les dynamiques d'innovation dans les régions périphériques et émergentes.

Mots-clés : Entrepreneuriat numérique ; Écosystème entrepreneurial territorial ; Start-ups numériques ; Innovation frugale ; Contraintes territoriales.

Introduction

Digital Entrepreneurship is emerging as one of the primary catalysts for economic transformation and innovation through an increasing number of startups that are using digital means (tools, platforms, and infrastructural support) to create value for their stakeholders. Digital technology also has the potential to transform how entrepreneurs are designing their new products, validating their ideas, and adapting their business models by lowering some transaction costs, providing greater access to information, improving the speed at which they can interact with customers, and increasing their number of sales channels (Nambisan, 2017). To fully understand the emerging themes in the research on the role of territorial entrepreneurship ecosystems in entrepreneurship and local development, Boussif, Ziri and Ait-Soudane (2024) point out that entrepreneurship is a major driver of regional economic growth creating positive externalities in underutilized areas, in particular, through job creation. In the case of the Dakhla-Oued Eddahab region, this perspective invites an analysis of how digital startups can contribute to the economic diversification of a territory historically dependent on fishing and agriculture.

Therefore, digital entrepreneurship should not be viewed solely as the use of digital tools, but rather as a new form of entrepreneurship that relies heavily on aspects of experimentation, rapid execution, and continuous innovation. That said, this is not a uniform process. Startups are fundamentally impacted by the context in which they find themselves, which can be defined as a collection of local resources, constraints, and interactions that consist of public sector actors and organizations offering support, professional networks, access to funding, availability of skills, etc.). In addition, emerging regions where the promise of digital technology will provide wider access to markets, improved service delivery, and better optimized operations also suffer from several structural limitations as a result of their geography. This study is specifically investigating how entrepreneurship affects the entrepreneurial ecosystem of the area around Dakhla, in the Oued Eddahab region, as well as the significance that digitalization makes in helping enhance growth for new business models established within this ecosystem. Digital entrepreneurship can be described as the process by which companies develop innovative products and services through digital technologies. Its development is dependent upon the local and/ or global context that the business operates in. Therefore, there is an important relationship between how the local territorial context of the Dakhla infrastructure helps give rise to digital entrepreneurship through various means, such as innovation and dynamics associated with

start-ups. For example, the local infrastructure plays a critical role in enabling start-ups to access the various resources necessary to build their initial capabilities for innovation. By studying the impact of entrepreneurship on the entrepreneurial ecosystem around Dakhla, researchers can better understand how various aspects of the local context affect the various phases of entrepreneurial initiatives. The results of this research will help identify which mechanisms can be used to develop and enhance the entrepreneurial ecosystem of Dakhla, as well as provide insights into how start-ups operating within it can use digitalization to improve their performance.

How does digital entrepreneurship contribute to the development of innovation dynamics within start-ups in an emerging territorial context, and how do these companies overcome the constraints related to their local environment?

This study's focus is on determining how businesses in the Dakhla-Oued Eddahab region are utilizing technology and digital platforms to create innovations, develop new products and services, utilize financial constraints in their business models, as well as implement their businesses in an innovative way. The Dakhla-Oued Eddahab region is an ideal setting for studying how businesses utilize digital tools and platforms, as it is an emerging region of southern Morocco that has the potential for entrepreneurial dynamics, meets local needs, and is still in the process of developing its entrepreneurial ecosystem. All of which create a suitable environment to observe the process of digital entrepreneurship when there are limited resources available. This research specifically focuses on four aspects: (1) the key digital practices/uses employed by entrepreneurs; (2) the types of innovations created by entrepreneurs and how they support them; (3) how territorial constraints impact the decisions of entrepreneurs; and (4) the adaptation strategies created by entrepreneurs; specifically, in regards to frugal innovation. Based on these four objectives, two research questions have been articulated:

-  **QR1: How do digital entrepreneurs leverage digital tools and platforms to innovate their business models, improve market access, and create value within the Dakhla-Oued Eddahab entrepreneurial ecosystem?**
-  **QR2: How do territorial constraints related to infrastructure, financing, digital skills, and institutional support shape the development of digital start-ups, and what adaptation and frugal innovation strategies do entrepreneurs implement to ensure their growth and sustainability?**

This research employs qualitative methodology to address research questions through semi-structured interviews with digital entrepreneurs, founders of start-up companies and members of the local digital start up community. The interview guide was designed to collect data on the interviewee's digital practice, processes of innovation and/or development of opportunities and challenges they face. Data analysis was conducted using thematic analysis to identify themes and patterns relative to actions taken and how innovations are configured (Braun & Clarke, 2006). This research intends to provide contribution at multiple levels: Theory: provides insight into the relationship between digital entrepreneurship, innovation, technology and territory within an emergent context; Empirical: documents an area that has received minimal attention by presenting specific digital practices and strategies for adapting; Managerial/Operational: identifies and presents possible actions to support the local ecosystem (skills, funding sources, support systems) to encourage innovation and sustain start-ups. The remainder of the paper goes as follows: literature review, conceptual model, research methodology, data analysis/reporting and conclusion including contributions, implications for practice, limitations and future research opportunities.

1. Literature review & conceptual framework

1.1. Digital Entrepreneurship

Nambisan (2017) states that everything we do to start, build, and change an economic activity through the use of digital tools and platforms is called digital entrepreneurship. Digital entrepreneurship has emerged as a new way to approach entrepreneurship and has been heavily influenced by technological advancements. As a result, companies engage in digital entrepreneurship at all stages of their lifecycle, using digital tools and platforms throughout their growth process. Digital entrepreneurship uses information and communications technologies (ICT) to improve or create new ways to conduct business, such as restructuring a company's value chain, lowering transaction costs, finding new customers, and changing how businesses communicate with their customers or partners (Hull et al., 2007; Giones & Brem, 2017). Digital entrepreneurship can be divided into several categories or dimensions. The first dimension of digital entrepreneurship is that digital technology provides access to customers via dematerialized channels. Second, digital technology enables new ways of monetizing and distributing products or services (including digital payments, online subscriptions, freemium models, or intermediary platforms).

There is a lot of agreement and disagreement among researchers in defining digital entrepreneurship. All three (Nambisan, 2017; Hull et al, 2007; Giones & Brem, 2017) agree that digital technology has been very influence in creating or changing an economic activity. They all also state that digital entrepreneurship is more than just making use of technology, it requires changing how an organization is set up as a business; reconfiguring the business model. The scope of this business model reconfiguration is where the researchers disagree. Nambisan (2017) has a broad definition that includes any economic activity that makes use of digital tools, while Hull et al. (2007) divide the types of entrepreneurship into categories based on how integrated the use of technology. Giones & Brem (2017) focus on process and stages within a life cycle of entrepreneurship. The issue of where to draw the line between digital and traditional entrepreneurship using digital technology continues to be debated. This source of confusion represents a major limit in methodology for the existing literature and makes it difficult to conduct empirical analysis of existing studies. Second, most of the existing literature is generally based on North American and European experiences, and little attempt has been made to develop a theoretical framework to understand how digital entrepreneurship is different in developing countries especially areas such as the Moroccan Sahara.

1.2. Innovation in start-ups

In an entrepreneurship research context, innovation within startups can be understood as the introduction (onto the market or within the organization) of new or significant improvements to the product or service, processes, or logic of value creation/capture. The Oslo Manual (OECD/Eurostat) offers a benchmark definition: a business innovation corresponds to a new/improved product (good or service) or a new/improved business process that differs significantly from the existing one and is effectively introduced (onto the market or “put into use” by the company).

Based on this, three levels of innovation are particularly relevant for analyzing start-ups (and usefully structure a thematic analysis framework):

-  **Product/service innovation:** creation of a new offer or significant improvement (features, performance, accessibility, quality of service, customer experience).
-  **Process innovation / business process:** transformation of internal activities (production/service, logistics, customer relations, marketing, administration, management, etc.).

 **Business model innovation:** modification of the “logic” by which the startup creates, delivers, and captures value (new revenue streams, new channels, new partners, change in value proposition). Teece (2010) emphasizes that the business model corresponds to the organizational and financial architecture of the company and that business model innovation can be a path to competitive advantage (if it is sufficiently differentiated and difficult to imitate).

The three levels of innovation (product, process, business model) presented by the OECD/Eurostat and Teece (2010) offer a useful analytical framework, but raise several controversies. Teece (2010) argues that business model innovation constitutes the most sustainable source of competitive advantage, an assertion contested by some authors who consider that this primacy neglects the fundamental role of basic technological innovation (Chesbrough, 2010). All authors agree that startups, by their agile structure and absence of organizational inertia, are particularly conducive to multidimensional innovation (product + process + business model simultaneously). The OECD has a normative and measurable approach to its methodology (that is, through statistical surveys), while Teece has a qualitative strategic approach. This difference in methodology makes it difficult to compare empirical results. Both of these theoretical constructs were created primarily in well-established start-up ecosystems. Their transposition into territorial contexts with limited resources, such as Dakhla-Oued Eddahab, requires a critical adaptation that the current literature does not offer.

1.3. Territorial dynamics and the entrepreneurial ecosystem: resources and constraints

Entrepreneurial actions are grounded within a territory characterized by both resources and restrictions. The entrepreneurial ecosystem concept represents this idea in that it holds that the entrepreneurial productivity within a region depends more upon a collection of connected components than it does on an isolated aspect. The most commonly referenced definition describes the entrepreneurial ecosystem as being "the interconnected web of actors and factors that create conditions conducive to productive entrepreneurship." Using the above concept, the territory can be understood as a configuration that consists of the following elements in particular: Infrastructure (connectivity, transport/logistics, equipment, workspaces); Human capital (skill level, talent availability, digital capabilities, training); Networks (links with clients, suppliers, mentors, diaspora, professional communities); Institutions and governance

(rules, public programs, service counters, quality of support services); Access to financing (banks, subsidies, business angels, venture capital, microfinance); Markets and demand (size, solvency, access to foreign markets); Entrepreneurial culture (norms, social legitimacy of entrepreneurship, acceptance of risk).

However, the digital transformation of public organizations, as analyzed by Lahlimi, Karim, and Wahbi (2023), requires infrastructural and organizational prerequisites that are not uniformly met across the national territory. The Dakhla-Oued Eddahab region has an essential gap between the theory of digitalization and the practice of implementing that theory, creating barriers for developing digital startups with no local public management fully outfitted. All of these components are dependent on one another. They interact and have the potential to impede or support each other, thus creating environments where two "start-up" regions can develop in radically different paths. To provide a clearer understanding of the regional context, the current literature often separates attributes into three categories: material, social, and cultural attributes. For instance, according to Spigel, ecosystems are made up of cultural attributes, social attributes, and material attributes, and the relationships between these types of characteristics define the resources that entrepreneurs can use to mobilize resources into fruition. The research indicated an overall, critical review that there is a lack of cohesive scholarship surrounding the three concepts of digital entrepreneurship, innovation in startups, and territorial entrepreneurship ecosystem. This research aims to create an overall model of three dimensions that articulate the three concepts into one by investigating how they are correlated to each other and the specific characteristics of Dakhla-Oued Eddahab.

1.4. Interactions between Digital Entrepreneurship, Innovation, and Territorial Ecosystem

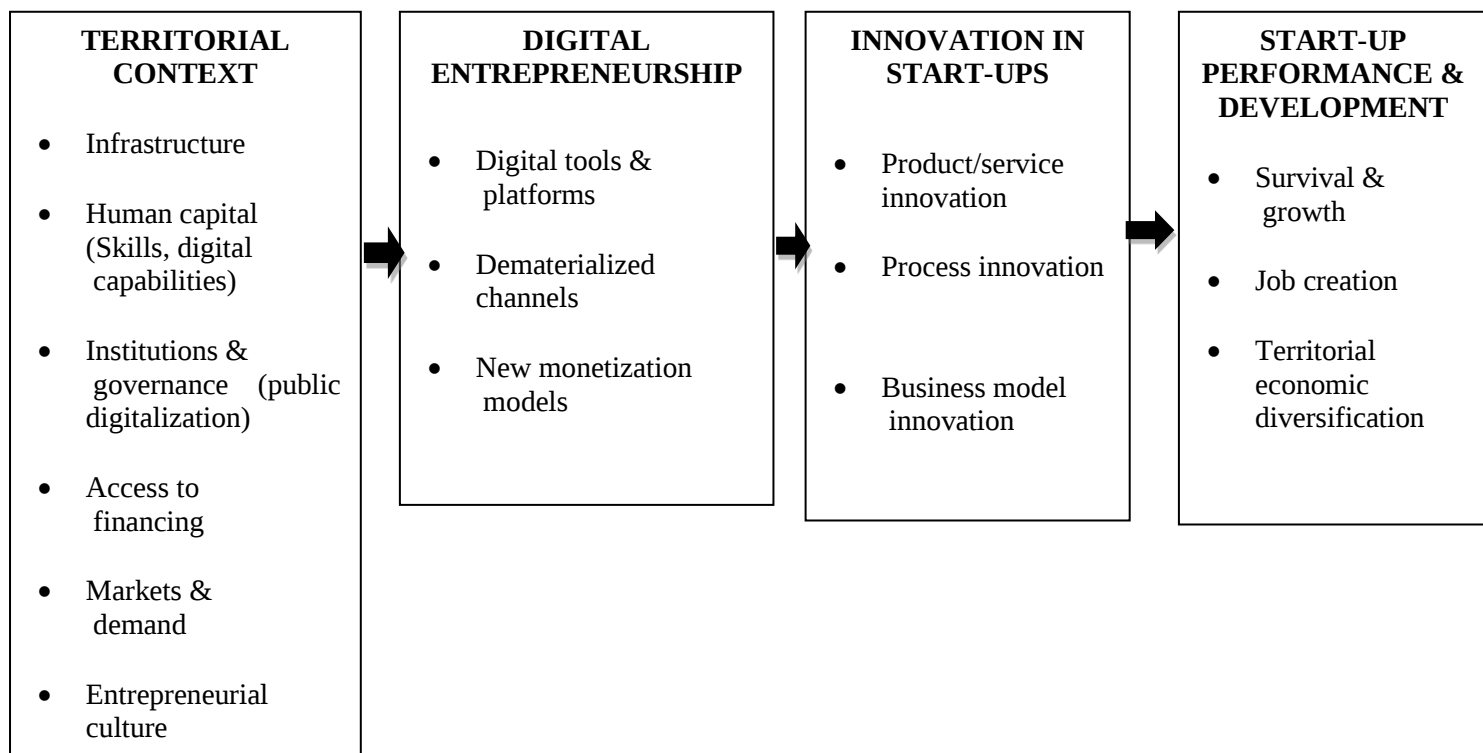
There are three theoretical relationships proposed by the model. First, the territory has an effect on how digital entrepreneurship is expressed by restricting the amount of access for people to digital media, such as the lack of connective infrastructure and/or a non-digitized public administration (Lahlimi, Karim, & Wahbi, 2023) to dematerialized channels and methods for digital monetization. Second, digital entrepreneurship enhances multi-dimensional innovation (product, process, and business model) by decreasing transaction costs and increasing access to the market (Hull et al., 2007; Giones & Brem, 2017). Third, business model innovation, in particular, constitutes the mechanism by which digital startups contribute to the economic diversification of the territory (Teece, 2010; Boussif et al., 2024). A retroactive relationship

also operates from performance back to the territory. The positive externalities generated by successful startups (job creation, territorial attractiveness) reinforce in turn the material, social, and cultural attributes of the ecosystem (Spigel, 2017), creating either a virtuous cycle or a vicious cycle in case of failure.

From this model, three research hypotheses are formulated.

- **H1:** posits that territorial constraints (infrastructure, governance) significantly limit the expression of digital entrepreneurship in Dakhla-Oued Eddahab.
- **H2:** suggests that digital startups in the region prioritize process and business model innovation over breakthrough technological innovation, due to the limited resources of the territory (frugal innovation).
- **H3:** proposes that the success of digital startups depends more on the quality of social networks and relational capital than on direct access to formal financing, in a context of low institutional density.

Figure 1. Conceptual Framework of the Study



Source: Developed by the authors.

2. Methodology

2.1. Research design

The aim of This research qualitative and exploratory is to develop a deep understanding of the phenomenon being studied, in this case, the contribution of digital entrepreneurship to innovation dynamics for start-ups, by investigating the phenomenological perspectives and experiences of the actors being studied (Creswell & Poth, 2018). Qualitative methodologies are most useful for examining complex processes; to gain a clearer understanding of the underlying rationale of actions and to learn how actors develop an understanding of their actions in relation to specific contexts (Yin, 2018). The research uses a territorial case study design, with the "case" being the Dakhla-Oued Eddahab Region Entrepreneurial Eco-System. The Dakhla-Oued Eddahab region is a viable site for conducting this research, for a number of reasons, including that it is an emerging territory, has a developing entrepreneurial ecosystem, is still developing its structures as an entrepreneurial eco-system and faces unique challenges (geographical isolation, developing infrastructure and limited resources), which makes the role of digital technology as an instrument for innovation and market access particularly pronounced. The territorial case study allows for the analysis of interactions between actors, resources, constraints, and strategies within a situated context, and produces rich and contextualized results (Eisenhardt & Graebner, 2007).

2.2. Fieldwork and sampling

The regional study provides opportunities to explore the dynamics of organizations interacting with one another, their respective resources, limitations and strategies within a local context, and generating high-quality, localised outcomes (Eisenhardt & Graebner, 2007). The research sample was made up of 2 groups of people: (1) those creating or managing new businesses in the Dakhla-Oued Eddahab region; and (2) those facilitating their success (incubators, support organizations, public sector entities, financing sources as well as associations). The following criteria guided our selection of participants:

-  **Sectoral diversity:** start-ups from different sectors (retail/e-commerce, digital services, agri-business, tourism, logistics, etc.) were selected to identify different patterns of usage of digital technologies.
-  **Maturity of the business:** this included new start-ups, (created within the past 6 months), growing start-ups (created more than 6 months but less than 2 years), and established or consolidating (created longer than 2 years) businesses.

- ✚ **Type of digital use:** must be significant usage of digital technologies during their business activity (e.g., online presence, digitally sold products/services (via latest social media channel, etc.), digitally provided services, or using digital methods to provide marketing for products/services).

In total, 10 interviews were carried out, consisting of seven founder/entrepreneur interviews and three ecosystem stakeholder interviews (incubator manager, funder, and support program representative). The average duration for each interview was half an hour in length. Theoretical saturation (Glaser & Strauss 1967) guided the stopping point of data collection, based on the premise that once sufficient quantity of interviews were performed, the amount of new information being gathered would be minimal. Empirical saturation occurred at the eighth interview with two additional interviews verifying the previously observed patterns and not identifying any additional categories of significant size. While ten interviews is a modest number, it is consistent with the number of interviews in exploratory qualitative studies where the field of research is homogeneous and saturation has been reached (Guest et al. 2006).

Participants were recruited through a purposive snowball sampling technique (Patton, 2015). The initial contacts were established through the regional incubator and the local chamber of commerce, followed by referrals from interviewed entrepreneurs to other founders within their networks. This method was chosen because the digital startup population in Dakhla-Oued Eddahab is small and not formally listed, making random sampling impractical.

2.3. Interview guide

The semi-structured interview guide was developed based on the conceptual framework and comprised three sections: (1) digital entrepreneurship practices, (2) innovation dynamics, and (3) territorial ecosystem constraints and resources. The guide was pilot-tested with one entrepreneur (not included in the final sample) and refined for clarity. Table 3 presents the main questions by theme.

Table 1: Semi-Structured Interview Guide

Theme	Key questions
Theme 1: Digital uses for market access	• How do you reach your customers? What digital channels and platforms do you use? • What role do social media, e-commerce platforms, or mobile applications play in your customer acquisition strategy? • How do you leverage digital tools to overcome

	geographical isolation and access markets beyond Dakhla-Oued Eddahab?
Theme 2: Innovation in supply and improvement of service	• What is new or different about your product or service compared to competitors? • Have you changed your internal processes since starting? How has digital technology enabled these changes? • How do you ensure quality and efficiency in your service delivery through digital means?
Theme 3: Business model innovation	• How has your business model evolved since the creation of your startup? • What revenue streams have you developed or diversified? • Have you experimented with new monetization approaches (subscriptions, freemium, platform-based models)? In what ways?
Theme 4: Territorial constraints and frugal adaptation strategies	• What are the main difficulties you face operating in Dakhla-Oued Eddahab? • How do infrastructure limitations (connectivity, transport, logistics) affect your business? • How do you access financing, mentorship, or training in this region? • What strategies have you developed to adapt to resource limitations? • What role do local institutions and support organizations play in your development?

Source: Author's elaboration based on survey data.

2.4. Data analysis and processing

The analysis of the data collected through semi-structured interviews was conducted using NVivo 12 software according to Braun and Clarke's thematic analysis theme. The use of Braun and Clarke's thematic analysis theme involved the following processes: initially, the researcher became familiar with the data through transcription and in-depth reading of the interviews; the researcher then developed initial codes for each interview based on recurring ideas, concepts,

and elements. The researcher then grouped the codes into themes and sub-themes according to the main elements of digital entrepreneurship, innovation dynamics, and the challenges facing the startups in the study area. After creating the final themes, the researcher then conducted a revision and validation stage to ensure that the final themes had internal consistency and relevance to the research objectives. A number of mechanisms were used to improve the credibility and quality of the results of this study, including triangulation of sources (entrepreneurs, incubator managers, and institutional actors); the use of a research journal that recorded the researcher's methodological decisions; and a validation of the researcher's interpretations through member checking with selected participants. These mechanisms helped to ensure the quality, rigor, and reliability of the qualitative analysis conducted in this study.

3. Results

The innovation dynamics observed in the startups investigated through thematic analysis of the collected data from digital entrepreneurs and ecosystem stakeholders in the Dakhla-Oued Eddahab region were characterized by four main re-occurring themes. These themes concern: (1) digital tools for market access, (2) innovation in product offerings and service improvement, (3) territorial constraints and development challenges, and (4) adaptation and frugal innovation strategies employed by entrepreneurs. Each theme has been identified in detail through documenting the major findings of the thematic analysis, supported by verbatim quotes from the interviews. This method of representing the themes allows for identification of the motivations of the various actors involved and also illustrates how digital technology contributes to the creation of value and development of entrepreneurs in the territorial context studied.

3.1. Profile of study participants

The table presents the main characteristics of individuals who were interviewed in this research project. The total number of individuals included in this sample was 10 stakeholders: seven digital entrepreneurs (70%) and three representatives of the supporting and funding organization (30%). This provided us the opportunity to compare how each group perceived an innovative project leader and the supporting or funding organization(s) to which the project leader would turn for support. Of all the individuals who were interviewed, there were more individuals who were men than there were individuals who were women (60% vs. 40%). In terms of educational attainment, approximately 90% of individuals have at least a bachelor's

degree; 50% of the individuals have a master's degree. The digital entrepreneurs whose organizations are represented in this study come from diverse sectors of e-commerce, digital services, agritech, digital tourism, and fintech. This diversity in sectors provides the opportunity for many different types of entrepreneurial experiences to be experienced by digital entrepreneurs. Referencing the entire sample again, approximately 50% of the organizations studied had been in existence for two-to-four years and had fewer than five employees, indicating that there are predominantly many small and young start-up organizations. The diversity of profiles of the individuals included in this study enhances the ability to analyze the dynamics of innovation and the digital entrepreneurial practices occurring in the Dakhla-Oued Eddahab region of Morocco.

Table 2: Characteristics of study participants (n = 10)

Variable	Category	Frequency (n)	Percentage (%)
Participant type	Digital Entrepreneurs	7	70%
	Actors in the entrepreneurial ecosystem	3	30%
Gender	Female	4	40%
	Male	6	60%
Level of education	Doctorate	1	10%
	Master	5	50%
	License	3	30%
	Bac +2	1	10%
Business sector	E-commerce	2	20%
	Digital services	2	20%
	Agritech	1	10%
	Digital tourism	1	10%
	Fintech	1	10%
	Support / Funding	3	30%
Age of the structure	Less than 2 years	2	20%
	Between 2 and 4 years old	5	50%
	More than 4 years	3	30%
Structure size	1 to 5 employees	5	50%
	6 to 10 employees	3	30%
	More than 10 employees	2	20%

Source: Author's elaboration based on survey data.

3.2. Analysis by theme

3.2.1. Theme 1: Digital uses for market access

Thematic analysis of the theme

The digital tools utilized by entrepreneurs in the Dakhla-Oued Eddahab area are crucial to their ability to find markets for their products. All of the interviewees noted that social media had proven to be the most important source of new customers, primarily because of the low cost and ability of social media channels to reach wide audiences quickly. An e-commerce entrepreneur said, ***“Facebook and Instagram are now my primary sales channels, with the majority of my new customers coming from these sites” (Interviewee 2).*** Digitalizing business processes has helped startup entrepreneurs overcome the obstacles they face because of their location and distance from large urban centers. Many startups have been able to use the internet and e-commerce to access national and international markets; thereby helping to alleviate some of the challenges of being situated in a geographically isolated location.

Moreover, the use of digital tools allows for a better understanding of customer relationships through interactive and responsive engagement. As mentioned by the participants interviewed, entrepreneurs utilize various solutions (WhatsApp Business, Facebook, Instagram) to maintain frequent updates with customers regarding their purchase history, to improve service delivery, and to increase customer loyalty. Despite these many benefits, the analysis of these interviews indicates that there are some potential shortcomings associated with using digital marketing methods. Overall, these findings indicate that access to the digital marketplace not only depends on the adoption of technology but also on the entrepreneur's ability to build a strategic skill set and effectively utilize the available resources in their entrepreneurial ecosystem.

3.2.2. Theme 2: Innovation in supply and improvement of service

Thematic analysis of the theme

Interviews indicate that companies' ability to innovate via products is one of the most significant impacts of implementing digital technologies. The entrepreneurs discussed how using digital technologies has given them access to new services, activities and ways to respond to changes in their industry. ***“Using digital technologies has enabled us to create rapid prototypes and modify our service based on customer feedback,” Participant 3”***). Results show that digitalizing the customer experience also enhances the quality of connections between companies and its customers. This includes better communication between the business and its customers with smooth interactions; improved tracking of customer requests, and improved response times to resolve problems. Additionally, entrepreneurs stressed the value of personalizing their services. The use of customer data and analytics allows them to recognize individual customer wants and needs and provide customized solutions to meet those needs.

This personalization results in enhanced customer satisfaction and loyalty, and creates a long-term competitive advantage.

As previously stated, businesses are still innovating despite difficulties in finding people who have the right skill set, finding sufficient funding, and using innovative technologies. Entrepreneurs continue finding creative ways to deliver new products and services using digital technology as an effective means of developing innovative products and services through digital methods (digitalizing customer relationships), personalizing products and services (using customer data) and developing entirely new products and services (utilizing the Internet to create new service markets). In terms of sustainability, however, these innovations rely heavily on the availability of appropriate skill sets, funding for development and the capacity of entrepreneurs to learn how to leverage these new approaches.

3.2.3. Theme 3: Business Model Innovation

Thematic analysis of the theme

The data shows that the startups included in the study have drastically changed their business models due to the possibilities that digital technologies provide. Many entrepreneurs have created modern business models that include subscription-type models, services provided on demand, and organizational platforms. As one participant stated: “***The subscription model helps us to guarantee part of our revenue while developing a base of loyal customers***” (*Interviewee 4*). The analysis of the data also reveals that digital platforms are critical to creating value. Digital platforms link together various economic actors, making it possible for companies to expand their markets without having to invest heavily in physical assets.

Moreover, partnerships are an important source of innovation in business models for startups. Collaborations with entities such as governmental organizations, corporations, incubators, and support organizations provide startups with access to the financial, technical, and relational resources necessary for innovative business models. The result of these relationships will be to improve their ability to Innovate, and compete.

In addition to the above-mentioned strategies for establishing sustained income streams from existing businesses, many entrepreneurs believe one strategy which should be emphasized in order to increase your ability to withstand uncertainty caused by the fluctuations of the economy or any other market is through diversification of activities within your business. Market / Economic uncertainty presents itself in many ways including start-up businesses providing multiple revenue streams or developing complementary activities to help protect against the

potential risks related to their core business activities. Many entrepreneurial entities have also expressed their frustrations with the following 3 issues: (1) monetization of digital services; (2) profitability of innovative service models; and (3) facilitate reliance upon major digital platforms in order to facilitate or distribute their services/products. Overall, these results support the conclusion that there is a significant digital transformation of business models by encouraging and enabling the use of innovative methods of creating and capturing value as well as developing new growth opportunities for Start-Ups; therefore many entrepreneurs use subscription models, digital platform, digital mediation, collaboration (with strategic partners), and business diversification as primary levers to achieve growth and sustainability. However, each of these models relies heavily on the entrepreneur's ability to develop sustained revenues through their ability to work collaboratively with their customers and adapt quickly to the changing marketplace.

3.2.4. Theme 4: Territorial constraints and frugal adaptation strategies

Thematic analysis of the theme

Data collected from the entrepreneur interviews identified several limitations or structural constraints impacting digital entrepreneurs in the Dakhla-Oued Eddahab region. Entrepreneurs who participated in this study reported that their greatest source of constraint was a limitation to financing, followed by limited access to specialized skills and/or certain types of technology. In addition, the entrepreneurs also identified geographic isolation from the primary economic areas of Morocco created limitations for businesses from establishing businesses within the Dakhla-Oued Eddahab region - as supported in one entrepreneur's citation, as stated in an interview, ***"to get investors or partners to want to work with businesses based out of Dakhla is difficult."*** (Interviewee 4).

Entrepreneurs have created multiple types of frugal innovation due to the limitations they currently face. A number of respondents preferred low-cost digital solutions, free software, or uncomplicated prototypes that would allow them to test out and collect data on these products before launching more significant investments

The findings from this research also indicate the role of entrepreneurial improvisation and resource sharing in providing an avenue for new venture creation. Many new ventures use their professional networks, partnerships, or support systems to augment the lack of internal resources. The results provide evidence that local constraints can be perceived positively and negatively. Local limitations limit some types of development opportunities, but also enhance

new and innovative methods for achieving success through creative flexibility, resourcefulness, and the ability to leverage/optimize existing resources.

4. Discussion

The findings of the study indicate that digital technologies are crucial in changing ways of doing businesses and innovating in entrepreneurs' practice within the Dakhla-Oued Eddahab zone. First, they corroborate previous literature on digital entrepreneurship, suggesting that digital technologies are essential to gaining access to markets, creating value, and providing new economic opportunities. Analysis shows entrepreneurs predominantly use social networks, digital platforms, and digital tools to enhance visibility, increase their customer base and reach customers outside their physical location. Therefore, this supports proposed links between digital technologies and reduced transaction costs when integrating into larger economies. Additionally, the findings also support the established theoretical links between digital transformation and innovative practice. The digital technologies used in the studied startups not only improve their sales communication, but also develop new products, customize their offerings and create a better overall experience for their customers. This is supported by the literature, which states that digital technologies encourage continual innovation because they allow for rapid testing and experimentation, provide quick responses to changing market conditions, and help to collect consumer data.

While Nambisan (2017) and Giones & Brem (2017) conceptualize digital entrepreneurship within resource-rich ecosystems, our findings reveal a distinct "peripheral digital entrepreneur" archetype that challenges this assumption. Unlike their metropolitan counterparts who leverage digital tools for scalability and global reach, entrepreneurs in Dakhla-Oued Eddahab deploy digital technologies primarily as compensatory mechanisms for structural deficiencies. Social media is not used for brand expansion but for geographical transcendence; e-commerce platforms serve not as growth accelerators but as survival infrastructure. This finding extends the digital entrepreneurship literature by demonstrating that the function of digital tools varies systematically with territorial context, a dimension previously undertheorized.

Our study reveals that business model innovation in this peripheral context does not follow the Teece (2010) model of strategic differentiation for competitive advantage. Instead, entrepreneurs engage in what we term "enforced frugal innovation" a hybrid form combining Hossain's (2020) frugal innovation with necessity-driven entrepreneurship. Entrepreneurs diversify revenue streams not to capture new market segments but to absorb volatility inherent

to underdeveloped markets. This represents a theoretical extension of the business model innovation framework, suggesting that in peripheral ecosystems, innovation logic is risk-mitigation rather than value-maximization

In addition, the findings of this study reveal that startup business models can be adapted and transformed with the implementation of new forms of value creation, including digital platforms, subscription models, digital intermediation, and business diversification. These findings support prior research that has demonstrated how the application of digital technology can lead to the reconfiguration of more traditional business models by creating new sources of revenue and improving the overall organizational flexibility of businesses. However, the findings also suggest that digital technology is not a sufficient stand-alone force behind entrepreneurial development. There are multiple factors, such as access to digital skills, access to financing, the quality of infrastructure and the presence of entrepreneurial support networks, that have the potential to limit the impact of digital technology in overcoming geographic barriers to opportunity.

The prevailing view on the relationship between infrastructure and entrepreneurship has been challenged by an unusual observation made by Entrepreneurs in this research. Rather than regard inadequate connection as a singular impediment, the Entrepreneurs in this study demonstrate that inadequate broadband creates a patterned rather than a uniformly obstructive effect on Entrepreneur activities in the geographical area we sampled. Inadequate broadband enhances the use of re-synchronization by entrepreneurs who employ offline workflows that can be synchronized only during intermittent connections from inadequate broadband service. Thus, the "infrastructure paradox" is that the Entrepreneurs use the constraints of inadequate broadband as a catalyst for developing creative solutions that require novel uses of technology and create new forms of value. The literature surrounding digital Entrepreneurship has thus far overlooked this infrastructure paradox and suggests that the entrepreneurial modality and quality of infrastructure work together to produce non-linear interactions between the two. The physical environment of space also plays a significant role in the formation of an innovation system for entrepreneurship.

Previous research has suggested that Entrepreneurs face geographic characteristics and territorial limitations as barriers to creating businesses. Our data indicate that, in addition to geographic limitations and physical characteristics as barriers, the geographical environment may be conducive to creating opportunities for Entrepreneurs. Entrepreneurial opportunities created in response to local market demands may also be generated by the attributes of a

regional space and the evolution of an innovation system for Entrepreneurs. Territory should be viewed not just as a limiting factor; territory can also promote innovation and create differentiation amongst competitors.

Our study suggests that the "digital" in digital entrepreneurship requires contextual unpacking. Nambisan's (2017) broad definition obscures significant functional variations: the same technology serves market access in one context, process innovation in another, and business model experimentation in a third. We propose a territorially-situated typology of digital entrepreneurship that classifies digital practices not by technology type but by territorial function: transcendence (overcoming geography), substitution (replacing missing infrastructure), and differentiation (creating local competitive advantage). This typology offers a more nuanced analytical framework for comparative studies across diverse territorial contexts.

Conclusion

The purpose of this research was to investigate how digital entrepreneurship impacts the innovation dynamics in start-ups located in the Dakhla-Oued Eddahab region. The research utilized qualitative methods which included conducting semi-structured interviews with entrepreneurs and stakeholders within the area's entrepreneurial ecosystem. The findings revealed that digital technologies play an essential role in the development of start-ups through access to markets, innovation in product offerings and services offered by start-ups and transformation of business models. The study also established that territorial limitations relating to financing, skill levels, infrastructure development and distance from markets continue to negatively affect the development and growth of start-ups in the Dakhla-Oued Eddahab region. Nevertheless, these obstacles create opportunities for the creation of innovative adaptation strategies based on frugal innovation, resource sharing and entrepreneurial improvisation. The research concluded that digital technology acts as an enabler of innovation and entrepreneurial development if supported by appropriate institutional and territorial contexts. The study provides some insights into how to better enhance the innovation mechanisms within emerging and peripheral territories. The study results provide meaningful insight into how project leaders can strengthen their digital/entrepreneurial skills in terms of maximising the potential that exists with the use of digital technologies. The study results also indicate that start-ups need to establish strategic partnerships as well as use the appropriate digital tools to improve their overall competitiveness and innovative capacity. Findings from this study encourage strengthening the support, training, and funding systems dedicated to innovative start-ups

within the regional framework. In addition, improving the digital infrastructure and enhancing the regional entrepreneurial ecosystem are essential factors in facilitating the growth of start-ups and supporting the development of sustainable digital entrepreneurship in a specific area of the Dakhla-Oued Eddahab region.

Limitations of the Research

This study has limitations, such as: (1) due to the small sample size used in this research, the results of the research will not be statistically generalizable to all Moroccan start-ups; (2) purposive sampling, which may result in bias regarding participant selection; (3) the findings are self-reported and occur at a specific moment in time, thereby limiting the ability to analyse changes over time; and (4) the fact that the research was for one area makes it impossible to generalize to other regional territories or regions that may have different characteristics.

Research perspectives

There are many ways to explore the results for further understanding of what was learnt. One option for future investigation would be to carry out comparatives between the region of Dakhla-Oued Eddahab with other regions in Morocco/Africa, using these sites as points of reference to compare and contrast digital entrepreneurship dynamics within their own regions. Another means of investigating data obtained in this study could be to use multi-methods by combining qualitative and quantitative analyses resulting in more rigorous results and testing of various relationships that exist between variables presented in the current work. A third approach could be longitudinal studies (track the same sample of entrepreneurs over time) give insight into how start-ups have developed, how entrepreneurship has changed/innovated over time, and how entrepreneurs will continue to be strong in the future through innovation, growth, and resiliency in new markets.

Our findings carry three **practical implications** for policymakers, support organizations, and entrepreneurs in peripheral territories.

- **For policymakers:** Rather than replicating metropolitan ecosystem models (business angel networks, venture capital funds), public intervention should prioritize digital infrastructure resilience (not just bandwidth but intermittent connectivity solutions) and recognition of informal financing mechanisms (tontines, family remittances) within regulatory frameworks.
- **For incubators and support organizations:** Training programs should shift from "scaling" narratives (inappropriate for peripheral contexts) to "resilience" and

"diversification" skills. Mentorship should connect entrepreneurs with diaspora networks rather than local business elites, who often lack digital experience.

- **For entrepreneurs:** Our study suggests that strategic patience accepting slower growth in exchange for market stability is a rational approach in peripheral ecosystems. The "move fast and break things" Silicon Valley mantra is maladapted to contexts where failure carries higher personal and social costs.

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