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Driving digital transformation and business model innovation in tourism through innovation labs: An empirical study

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ABSTRACT

In the rapidly changing digital landscape, Innovation Labs have become pivotal agents of transformation, yet their application in tourism remains underexplored. This study addresses this gap through multiple case studies and an action research project focused on tourism. The findings reveal that Innovation Labs significantly boost digital innovation capacity, digital transformation, and business model innovation within tourism organizations. The proposed management framework offers practical guidance for effective implementation, emphasizing their potential to democratize technology and innovation, particularly for SMEs. These conclusions underscore the role of Innovation Labs as key drivers of innovation, providing valuable insights for both academics and practitioners.

1. Introduction

In the digital age, tourism organizations face the challenge of selecting **the most** appropriate innovative digital solutions that ensure integration with the territory, **while also protecting and enhancing** of cultural heritage and landscape, as well as understanding and adapting to the needs and attitudes of customers (Pencarelli, 2020). Digital transformation (DT) in tourism refers to the comprehensive integration of digital technologies in all areas of a business, fundamentally changing how organizations operate and deliver value to customers. This includes the adoption of technologies such as mobile applications, artificial intelligence, augmented and virtual reality, big data, and cloud computing, which collectively enhance efficiency, personalization, and connectivity (Verhoef et al., 2021).

These are therefore very diverse technologies that are transforming tourism in several ways, from how businesses operate to how tourists experience destinations. Technologies such as cloud computing/mobile technologies, blockchain, data analytics, cloud computing, artificial intelligence can support business management and help connect tourism organisations with right audience and markets. **Meanwhile**, others, such as virtual/augmented reality, Internet-of-Things can create entirely new products and experiences for tourists.

Today, the tourist experience must be adapted and refocused to meet changing demands, **driven by** the introduction of innovative digital solutions that favour ease of travel, access to real-time information, customization possibilities, and the simplicity and speed of service acquisition. After Covid-19, the need for digital innovation journeys and DT has become even more pronounced among tourism

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organizations, with the pandemic acting as an accelerator of DT dynamics (Vlassis, 2021). Consequently, digital innovation, already a critical topic, became a mandatory priority post-pandemic (Anderson et al., 2020).

In the past year, tourism organizations were compelled to invest in innovation, implement digital technologies, approach DT, and rethink services, products, processes, and business models due to health protocols and new security requirements. Now more than ever, the competitiveness of tourism organizations depends on their innovative digital capacity and their ability as operators and destination managers to rethink their offerings in light of newly emerging technological trends and socio-economic challenges.

However, engaging in digital innovation journeys is not easy, especially for SMEs in the tourism sector. These organizations often lack sufficient financial resources, the right skills, culture, and mindset to tackle digital innovation initiatives (McPhee et al., 2016). Tourism organizations, and more generally SMEs, need support to develop innovation capacity and enable them to embark on DT and Business Model Innovation (BMI) processes to improve their offerings, competitiveness, efficiency, and customer relationships.

In such a scenario, the search for approaches and management initiatives to promote DT, BMI, and digital innovation capacity of tourism organizations in the Digital Age appears relevant.

In the last decade, Innovation Labs have emerged as a valuable solution to help organizations develop innovation capacity that fosters DT and BMI, increasingly attracting interest from academics and practitioners (Fecher et al., 2018; Trucker, 2017).

Innovation Labs are innovation management initiatives that aim to foster creative and critical thinking and help organizations find the best ways to generate knowledge and digital culture, adopt technologies, digitize operations, and implement digital strategies for continuous and sustainable innovation pathways (Santarsiero et al., 2021; Schiuma and Santarsiero, 2023).

Originally, Innovation Labs were conceived as closed and almost "secret" laboratories within large companies. Companies gradually adopted them as innovative spaces to showcase technologies or foster creativity (Lewis and Moultrie, 2005; Magadley and Birdi, 2009).

In recent years, Innovation Labs have started to "open their doors" and evolve into management catalysts that foster innovation and support open, collaborative, and user-driven innovation dynamics (Trucker, 2017; Turrin, 2019). Various studies have investigated the use of Innovation Labs for encouraging, promoting, and driving innovation in several sectors (Memon et al., 2018; Turrin, 2019). In the tourism sector, however, the use of this management system remains under-investigated (Guimont and Lapointe, 2016; Yati Yati, 2022).

Moreover, the literature on Innovation Labs reveals that the management of these unique labs is still a relatively unexplored topic. Some frameworks have been proposed, focusing primarily on the operational logic of Innovation Labs, the use of physical space, and the impact of the creative process on innovation dynamics within an organization (Magadley and Birdi, 2009; Lewis and Moultrie, 2015; Carstensen and Bason, 2012; Gey et al., 2013; Morel et al., 2016; Fecher et al., 2018; Osorio et al., 2018; Turrin, 2019). However, more knowledge is required to understand the management dynamics of Innovation Labs fully.

Given this context, this research delves into the following research questions: "How can an Innovation Lab contribute to the development of Digital Innovation Capacity, DT, and BMI in tourism organizations? How can an Innovation Lab be managed for this purpose?".

To address these questions, a multifaceted approach was employed. First, the study investigated and identified the compelling management dynamics that distinguish Innovation Labs through multiple case studies. The case study analysis provided the foundation for the development of the 'Innovation Labs management framework,' which details essential stages and managerial features characterizing the operational processes of an Innovation Lab.

Subsequently, through a 15-month Action Research (AR) project, the framework was validated and applied to understand how tourism organizations can fruitfully use Innovation Labs to embark on DT and BM journeys. The paper is organized into distinct sections to facilitate a comprehensive exploration of the research objectives. The second section elucidates the theoretical background, incorporating a review of existing literature on innovation labs, digital transformation, and business model innovation. Following this, the third section expounds on the research methodology, providing a detailed account of the approach adopted for empirical investigation. Moving forward, the fourth section encapsulates the findings derived from multiple case studies, shedding light on diverse insights gleaned through rigorous analysis. Simultaneously, the fifth section delves into the outcomes of the action research. The subsequent sections, six and seven, engage in a holistic discussion of the theoretical and managerial implications unearthed by the research. Additionally, these sections conscientiously address the study's limitations while presenting avenues for future development.

2. Theoretical background

This study draws upon three fundamental theoretical frameworks to elucidate the role of Innovation Labs in steering DT and BMI **while driving** social change within the tourism sector.

Firstly, the lens of innovation management theories provides insights on processes and strategies to promote innovation (Bharadwaj et al., 2013; Hernandez-Vivanco et al., 2018; MacVaugh and Schiavone, 2010; Mastrocinque et al., 2022). By understanding how organizations manage innovation, gaining a more profound comprehension of how Innovation Labs can act as catalysts for DT and BMI became possible. Secondly, DT theories shed light on the crucial role of technology in the tourism industry, emphasizing the imperative for organizations to become agile and reactive to digital trends and societal changes (Berman, 2012; Schiuma et al., 2021). As technology continues to advance, companies in the tourism sector find themselves in a pivotal position. They must adopt digital innovations to stay competitive and meet the changing needs of customers and societal trends. Lastly, business model theories offer a structured framework for comprehending how organizations can dynamically transform their existing business models to effectively navigate the digital age and address societal shifts (Schiavone et al., 2021; Schmidt and Scaringella, 2020; Weill and Woerner, 2013). The rapid evolution of technology necessitates a reevaluation and adaptation of traditional business models to ensure the sustained viability of organizations (Schiuma and Santarsiero, 2023).

2.1. Innovation labs as catalyst for digital transformation and business model innovation

In recent years, organizations have recognized the benefits of establishing Innovation Labs as dedicated spaces for fostering innovation (Timeus and Gascó, 2018). Analyzing various organizational experiences reveals that Innovation Labs are increasingly seen as innovation management initiatives that involve creating an innovative space—be it physical, virtual, hybrid, or relational—defining dedicated time for innovation, and developing a platform that includes both tangible and intangible infrastructure (Santarsiero et al., 2021). These labs are designed to foster creative and innovative thinking through various forms, utilizing diverse human, organizational, relational, and technological resources with the primary aim of supporting innovation activities (Wagner and Watch, 2017).

The approach to establishing an Innovation Lab can vary significantly based on the size of the organization. Large companies often set up internal Innovation Labs or restructure traditional R&D centers by incorporating open innovation and user-driven paradigms. Conversely, SMEs, due to resource and expertise constraints, tend to favor sharing and utilizing hybrid and external Innovation Labs (Van Goolen et al., 2014). Innovation Labs serve as collaborative ideation spaces that break down the traditional barriers of laboratories, allowing diverse participants—including employees, users, and other stakeholders—to engage in creative and innovative activities.

Innovation Labs enable organizations to adopt open innovation, user-driven innovation, and collaborative innovation paradigms, overcoming hierarchical structures and promoting stakeholder participation in the co-creation of potential innovations (Lewis and Moultrie, 2005; Memon et al., 2018; Osorio et al., 2019). These labs are not merely "innovation theatres" but act as engines that drive and support the creation and application of new knowledge within organizations.

Despite the widespread interest in Innovation Labs across various sectors, empirical studies within the tourism industry remain notably scarce (Guimont and Lapointe, 2016; Santarsiero et al., 2021). This gap is particularly significant given the industry's inherent focus on personalized human interactions (Pencarelli, 2020). The tourism sector's resistance to technological disruptions, which are integral to its offerings, has slowed the integration of Innovation Labs. Additionally, the prevalence of SMEs, often family-run, in the tourism and culture sector adds to the challenge. These SMEs face barriers to innovation and digital development due to limited economic and human resources, skills, cultural mindset, and dedicated time for innovation initiatives (Najda-Janoszka and Kopera, 2014; Rodriguez et al., 2014).

Existing literature shows a lack of applications of Innovation Labs in the tourism industry. Most instances involve the creation of Living Labs coordinated by public institutions and guided by policy frameworks for user-centered development strategies. While these initiatives are promising, they only partially exploit the potential of Innovation Labs (Guimont and Lapointe, 2016; Jernsand, 2021).

The slow adoption of Innovation Labs in the tourism sector reflects a broader shift in the competitive landscape. Increasing emphasis on open innovation, user-driven approaches, and co-creation is democratizing innovation, making it more accessible to SMEs in the tourism sector. Aligning technological advancements with these trends presents a significant opportunity for the tourism industry to leverage digital solutions for their benefit.

In the subsequent sections, we will delve into the concepts of DT and BMI within the tourism industry. These theoretical frameworks, alongside the role of Innovation Labs, are critical for understanding how these labs can unlock their full potential in fostering innovation and enhancing competitiveness in the tourism sector. By exploring DT and BMI, we aim to provide a comprehensive analysis of how technological advancements and strategic business model shifts can be effectively managed and leveraged through Innovation Labs to drive sustained growth and adaptation in tourism organizations.

2.2. Digital transformation in the tourism industry

In tourism, as in other sectors, DT provides opportunities to scale, grow, improve efficiency and productivity, gain a competitive advantage, and foster innovation. Specifically, in tourism, DT enables the innovation of offerings and destination management, customize packages, and develop new types of products and services, as well as provide policy guidelines and insights for enhancing local tourism ecosystems. It's important to recognize that DT "provides the tools, frameworks, and technologies to create and/or add value to tourism products and experiences, but the success of digitalization depends on the capacity of the tourism sector to share, learn, and collaborate" (Dredge et al., 2018, p. 6).

Compared to other sectors, tourism is characterized by a fragmented offer and labor-intensive sub-sectors, with a strong emphasis on human interaction and direct client contact, making it naturally resistant to innovation and digitalization (Meyer and Meyer, 2015). Moreover, tourism sub-sectors vary greatly in terms of resources, access to finance, skills, culture, and other factors. This complexity makes the path towards DT complex and challenging for tourism organizations.

To ensure an effective DT process in tourism, a holistic vision that engages the entire sector is required. Unlike other sectors, tourism's DT must not only focus on technological advancements but also on developing and promoting an integrated ecosystem based on innovative solutions that involve and create value for all stakeholders.

Technology and digital innovations are transforming the world, influencing habits and market dynamics. The advent of Industry 4.0, initially coined for manufacturing, describes the integration of new digital technologies and managerial approaches with traditional business methods to achieve the productivity levels demanded by the market (Lasi et al., 2014). This concept has expanded to other economic sectors, including tourism, which shares characteristics with both the industrial and service sectors. Consequently, tourism is undergoing a profound transformation driven by technological evolution. The technological transformation in tourism has evolved from the initial adoption of the Internet for digitizing offerings, through the consolidation of digital business ecosystems with the rise of virtual marketplaces and OTAs, to the current integration of advanced technologies like cloud computing, VR, and GPS, which are creating new opportunities for products, services, and business models (Xiang and Fesenmaier, 2017).

This technological evolution has transformed the sector, sometimes disruptively, necessitating new ways of planning and configuring destinations, business models, value chains, and ecosystems. Artificial Intelligence, analytics, big data, cloud computing, and other emerging technologies, along with new customer behaviors, have given rise to trends such as platformization, prosumerization, and business virtualization (Balakrishnan, et al., 2023). Innovative companies and startups that are context-aware, resilient, and visionary have disrupted the market, while those failing to adapt face significant pressure to reconfigure their businesses. Technological advancements also enable a reconceptualization of destination configurations. The interconnection between the physical and digital worlds allows for the reimagining and customization of visitor experiences, enhancing new destination models like rural areas and lesser-known locations impacted by industry fragmentation.

In this new context, the roles of visitors, tourism operators, and producers are evolving. Visitors are becoming prosumers, seeking active involvement in their experiences. Consequently, producers must rethink their services and offerings, and tourism organizations should facilitate iterative dialogues between all involved actors.

As highlighted, effective and targeted DT in tourism requires "a collaborative network and learning environment so that SMEs can be inspired by technology-savvy businesses both in and outside tourism and can learn and collaborate together" (Dredge et al., 2018, p.10). While technologies and digital innovations may be new, their radical and disruptive potential lies in how they are leveraged. This emphasizes the importance of the logic behind technologies and the resulting business models, leading us to the concept of BMI.

2.3. Business model innovation in the tourism industry

In our increasingly digitized world, BMI plays a crucial role for organizations striving to maintain their competitive edge (Ammirato et al., 2022). The rapid advancement of digital technologies has not only made BMI essential but has also enabled the creation of new business paradigms at an unprecedented pace. These innovative models provide opportunities for businesses that can adapt quickly and innovate, thus transforming their operations. For example, digital platforms and AI have disrupted traditional industries by introducing new markets and services, underscoring the critical importance of BMI in adapting to technological changes and fostering innovation.

However, implementing BMI is a complex process that requires a comprehensive understanding of strategic objectives, competitive landscapes, and consumer behavior. The journey towards BMI begins with a thorough analysis of existing business models, identifying areas for improvement, and developing and testing new approaches (Heikkila et al., 2017).

Several factors drive BMI, with technology, customer behavior, and competition being the most significant. Technology enables the development of new products, services, and processes that can transform organizational operations. Customer behavior also plays a crucial role, as modern consumers increasingly seek personalized and convenient services, compelling companies to adapt their business models to meet these evolving demands. Additionally, competition drives BMI, with new entrants frequently disrupting established industries, forcing companies to modify their business models to stay competitive.

In the tourism industry, BMI has gained significant importance due to the profound impact of DT on the sector. A study by Linton and Öberg (2020) highlights the importance of digitalization and destination location as key factors in shaping tourism business models. This research identifies four primary types of tourism business models: traditional models typical of conventional tourism businesses located in popular destinations relying on proximity to attractions and dedicated facilities without heavily depending on digital capabilities; transformative models where organizations operate in areas not typically visited by tourists and must transform these locations into appealing destinations using moderate digital capabilities to communicate unique value propositions and deliver exceptional experiences to attract travelers; intermediary models that act as platforms connecting travelers with destinations in the digital realm, further enhanced by AI technologies to personalize services and experiences; and digitalized destination models where advanced digital capabilities integrate digital ecosystems to provide tourists with technologically advanced experiences through technologies such as big data, analytics, IoT, AI, and smart devices.

Given these diverse business models, it is crucial to align BMI strategies with specific objectives. The primary goal in tourism, as in other sectors, is to generate value through improved performance, a better understanding of the competitive landscape, and the development of more attractive products and services (Chesbrough, 2007). BMI should be pursued through tailored pathways for each business model type, with a strong emphasis on DT. Digital capabilities not only enhance the attractiveness of destinations but also fundamentally shape these tourism business models.

AI, in particular, can enhance personalization, optimize operations, and provide deeper insights into consumer behavior, further driving innovation and efficiency in tourism business models. Integrating AI within these models allows for real-time customization and improved decision-making, which can significantly boost the overall tourist experience and operational effectiveness.

BMI is therefore essential for tourism organizations aiming to stay competitive in a constantly evolving landscape. Digitalization and destination location significantly influence the types of business models that can be adopted. By focusing on the key value drivers—novelty, efficiency, complementarity, and lock-in—tourism organizations can successfully navigate BMI. The integration of DT is vital for achieving a strong market position and meeting the evolving demands of tourists in the digital age and the era of smart tourism (Gretzel et al., 2015). Innovation Labs can play a pivotal role in facilitating this transformation by providing the necessary environment and resources for developing and testing new business models.

3. Methodology

This study employs a multifaceted approach encompassing multiple case studies and an action research (AR) project, to delve into the management features of Innovation Labs, and explore their efficacy in boosting tourism organizations towards DT and BMI.

Regarding the multiple case studies approach, nine Innovation Labs were visited and observed, and their respective managers were interviewed. The choice of multiple case studies approach is judged the most appropriate for this research for several reasons. First, qualitative analysis carried out through case study methodology is suitable for broad, complex, and not yet fully defined concepts, like that of Innovation Labs still is (Oh et al., 2016; Gomes et al., 2018). Moreover, this methodology well fit to answer wide RQs, usually expressed in terms of "why" or "how" (Yin, 1994). In this empirical investigation, the main objectives are: understanding the "how" an Innovation Labs is managed, and "why" these labs are instituted, for which purposes and objectives, as well as what are the key aspects to consider for developing such initiatives.

Furthermore, case studies research is also well-suited for the analysis of complex fields that should be too complex with surveys, as often did in the field of Innovation Labs (Yin, 1994; Memon et al., 2014; 2018). Lastly, employing multiple case studies fits well with current research stream on Innovation Labs. In this regard, there is still a lack of systematisation of research results, and the literature suggests focusing more on empirical studies (Memon et al., Osorio et al., 2018). Current academic literature counts several single cases (Fecher et al., 2020; Magadley and Birdi, 2009; Zivkovic, 2018) or web-based studies (Memon et al., 2014) analysing specific issues of these Labs. Broadening the panel of cases to consider appears helpful to provide a clear understanding of the phenomenon and fill the literature's gaps mentioned above. The multiple case studies were carried out by considering nine Innovation Labs operating in different sectors outside tourism. These labs were selected from Finland, a region recognized for its successful and advanced initiatives, particularly in supporting SMEs (Santarsiero et al., 2023). Finland's numerous and progressive Innovation Labs provide excellent examples that can help derive managerial and operational implications. These insights are valuable for contributing both theoretically and practically to understanding the phenomenon, thereby laying the groundwork for testing the applicability of the resulting model to the tourism sector, which still has relatively few such initiatives. The selection of the nine case studies was based on the typologies identified through the systematic literature review conducted by Schiuma and Santarsiero (2023). According to the authors, Innovation Labs have been grouped into seven typologies according to their aims, users, functions, provided services and infrastructures: working labs, fabrication labs, firm-driven innovation labs, public-driven innovation labs, investors-driven innovation labs, academic-driven innovation labs, and living labs. In this vein, the choice of the sample fell on the selection of an Innovation Lab per typology (Table 1).

The analysis of Innovation Labs operating in various sectors and referring to the identified typologies provided a comprehensive understanding of the phenomenon, as well as the identification of key features related to the functioning and management of these Labs.

In particular, the analysis resulted in the formulation of the "Innovation Labs management framework", which describes the key stages that distinguish the operational processes involved in managing an Innovation Lab.

Subsequently, a 15-months AR project, in which the authors were directly involved, was designed and conducted to validate the framework and apply it in tourism setting, where the use of Labs is still in its infancy. The AR methodology was chosen because it is particularly suitable for studying events or issues typical of emergent contexts in order to change practises through interventions and develop a theory from them (Ollila and Ystroem, 2020). The value of AR results in that research informs practice and vice versa, making it adapt for situations in which there is no alternative other than beginning the work and then adjusting it as findings come in (Checkland and Holwell, 1998).

The AR project was conducted with a tourism organization in Southern Italy. The choice of Southern Italy as a case study is significant due to the region's tourism industry, which is largely comprised of small, often family-run businesses. These enterprises face high barriers to innovation and digital transformation and thus require substantial support. Innovation Labs, acting as intermediaries and facilitators, can help overcome these barriers by providing the necessary resources and guidance. This support can significantly impact the entire sector, and the successful implementation of such initiatives can be replicated in other contexts. The participating organization was engaged and supported in developing an Innovation Lab to foster digital innovation capacity, DT, and BMI, adapting successful practices from other sectors to meet the specific needs of the tourism industry.

The decision to employ the AR methodology is supported by several reasons. First, it offers an opportunity to develop the innovation capacity of Welcome Lucania, the company involved in the project. Additionally, AR is particularly suited for innovation management research where rigid frameworks are lacking, making it adaptable to evolving research paths (Argyris, Putnam, & Smith, 1985; Checkland & Holwell, 1998; Eden & Huxham, 1996; Greenwood & Levin, 1998; Gummesson, 2000; Susman & Evered, 1978; Whyte, 1991). The methodology is especially valuable for investigating emergent contexts, contributing useful data for theory development in Innovation Management (Ollila and Yström, 2020).

Three main benefits of AR in Innovation Management are highlighted in the literature: it provides closeness to living emergent systems, generates rich insights, and produces knowledge for both rigorous theory development and practical change (Ollila and Yström, 2020). AR requires researchers to balance their roles as both outsiders and insiders, reflecting on and influencing the evolving research path, while ensuring that findings inform both academic research and practical applications (Coghlan, 2011).

While AR has its limitations, such as requiring access to willing organizations and being time-consuming, its potential to understand and improve practices in emergent contexts makes it particularly suited for this study. The AR project in Southern Italy aims to

Table 1
Case Studies: Innovation Labs' typologies.

Innovation Labs' Typology	Working Lab	Fabrication Lab	Firm-driven Innovation Lab	Public-Driven Innovation Lab	Investors-driven Innovation Lab	Academic-driven Innovation Lab	Living Lab
Case Study	**Case G**	**Case F**	**Case B; Case H**	**Case A; Case D**	**Case C**	**Case E; Case I**	**Case D**

demonstrate how Innovation Labs can support DT and BMI in tourism, providing insights that can be applied to similar contexts elsewhere.

3.1. Data collection

In this research, a 'case' is considered a single semi-structured interview with the manager of an Innovation Lab, which also included a visit to the Lab to observe spaces and routines. Data were collected from the nine managers of Innovation Labs during three-month research. The interviews were based on a pre-tested protocol with twenty questions focusing on the management dimensions of the Lab. The development of each case allowed for the collection of primary and secondary data to ensure triangulation based on multiple sources of evidence (Yin, 1994).

At the end of each visit and interview, the findings were transcribed. The notes were entered into a structured database to keep track of the evidence and facilitate discussion and comparison of the different cases analysed. Each case was thus investigated before the subsequent case was conducted. This approach allows for a literal replication to confirm the earlier research and a theoretical replication to confirm or refute the patterns identified up to that point (Yin, 1994). The reflections made after each interview raise new perspectives and new questions to be explored in the subsequent analysis. Therefore, the interview protocol is open to expansion and adaptation as the investigation develops.

Moreover, the analysis of each case, focusing on management dynamics, helps identify the characteristic management phases of Innovation Lab. In this sense, a management model was already emerging after the first three cases. Therefore, the subsequent cases were conducted starting from this model to verify or discard it. New questions added to the protocol were based on the emerged phases of the model to assess their relevance or inconsistency. This was done with the overall aim of proposing an Innovation Labs' management framework.

The AR project consisted of two cycles and was based on various qualitative methods: *documentary analysis; Observation* of routines and attitudes during every day work; *narrative interviews* (Kaudela-Baum and Endrissat, 2009), with the participant organisation; *online webinars* to engage the local community, stakeholders and tourism organisations to detect context challenges, trends and opportunities; *hackathon* organised at the end of the first cycle to generate innovative solutions based on the data collected during the previous phases and activities; *focus groups*, organised during reflection phases to debate on results and gather insights for the correct development and implementation of innovation processes.

4. Understanding the management dynamics of innovation labs: the multiple case studies

The analysis of multiple case studies provides crucial insights into the management dynamics of Innovation Labs, contributing significantly to answering the research question about their effective management and leading to the creation of a comprehensive framework. This section clarifies the role of Innovation Labs in fostering DT and BMI, addressing existing literature gaps and laying the groundwork for applying these insights within the tourism industry.

4.1. Purposes and roles of innovation labs: case studies description

The case studies reveal that Innovation Labs are designed to cultivate an entrepreneurial mindset among employees, students, or other involved individuals. These labs aim to support innovative behavior and foster an innovation-friendly culture within

Table 2
Analysed Case studies.

Case Study	**Purposes and Objectives**
Case A	Boosting the innovative thinking of their members (people, organisations, startups) and support the development of innovation projects. Its broader goal is to help the startup and entrepreneurship mindset, so the development of an innovative capacity of people and organisations to foster the subsequent development of many startups and unite them in a collaborative ecosystem.
Case B	They were speeding up the time to market boosting digital transformation and disruption in organisations belonging to their community. This Innovation Lab's overall aim is to make leaders and winners meet, thus, bring companies and research together to develop and exploit joint innovation projects.
Case C	They are helping to increase the number of startups in the region through coaching, mentorship, training and organising networking events and prize competitions.
Case D	Promoting healthcare professionals' chances of success and offering their expertise to startups and established companies, healthcare developers, clinicians, and researchers. The Lab enables a wide range of networking opportunities, finding partners and implementing joint development projects to test and develop business ideas in healthcare.
Case E	Offering events, training programs, and additional studies to develop entrepreneurial skills and attitudes also supports an entrepreneurial way of doing things, sparing those who want to become entrepreneurs and those with an idea for an innovation.
Case F	Giving participants some practice to make them know that not every theory works in practice. Helping users in increasing awareness on prototyping and in managing tools for testing and developing business ideas.
Case G	Activating cross-fertilisation dynamics for fruitful innovations in a co-working space.
Case H	Helping global and local organisations build future-proof businesses and design victorious business models and futures strategies
Case I	Fostering entrepreneurial attitudes and mindset in students at the beginning of their studies gives them the opportunity to build a real startup and work on it.

organizations. This environment stimulates the generation of new ideas, products, services, processes, and business models, thereby facilitating DT and BMI processes (Aloini and Martini, 2013; Boyles, 2016; Møller, 2007). These findings aligns with existing literature emphasizing that the primary role of Innovation Labs is to enhance innovation capacity at various organizational levels, including individuals, teams, communities, networks, and local ecosystems (Timeus and Gascó, 2018).

Specifically, the case studies show that three of the nine Labs focus on training and developing entrepreneurial attitudes and innovation capabilities that enable DT and BMI. Meanwhile, four others primarily stimulate idea generation related to product, process, or service innovation and business models, thereby improving organizational productivity and readiness for DT (see Table 2).

4.2. Management processes of innovation labs

A deeper look into the management processes of Innovation Labs reveals several critical phases. Initially, almost all labs conduct a contextual analysis phase to understand the strategic intentions on which to focus their innovation projects. This involves identifying challenges within the scenario and transforming them into opportunities.

Strategic intentions are defined in two main ways. In some labs (case studies A, B, C, F, H, I), strategic goals are determined based on the needs of participants—whether individuals or organizations—seeking solutions to challenges, skill development, or innovation. These participants receive support and services from the Lab following an initial assessment. In other labs (case studies D, E, G), the Lab itself identifies strategic intentions based on issues relevant to the organization it serves, engaging with the external ecosystem to gather resources and expertise.

After defining the scope of innovation, labs identify and allocate necessary resources, assemble work teams, plan training programs, and organize networking events. This phase involves external actors to address internal gaps and stimulate creative processes with diverse perspectives. The facilitator plays a pivotal role here, creating a conducive environment for innovation and aligning stakeholders with defined objectives.

The operational phase follows, focusing on developing and exploiting innovative processes. This core activity varies depending on the Lab's type, aiming to generate skills, attitudes, products, services, and innovative digital solutions that fulfill the Lab's mission of fostering DT and BMI.

An interesting finding from the analysis is the common practice of reflection and feedback collection after the completion of innovation activities. Despite this, many labs lack structured methods for performance evaluation and impact measurement, highlighting a need for further research on best practices and evaluation guidelines. Publicly funded labs (case study D) and investor-driven labs (case study C) show some structured approaches, focusing on reporting and economic value metrics, respectively.

4.3. The innovation labs management framework

The comparative analysis of the investigated Labs reveals a strong repetition, repeatability and replicability of some management processes. These processes can be delineated as distinct phases that define the management model of an Innovation Lab (see Fig. 1).

This model generalises the aspects that emerged from the comparative analysis, ensuring replicability and providing a clear understanding of a phenomenon that has garnered increasing among researchers and practitioners.

However, it should be emphasised that not all the analysed Innovation Labs internally execute every mentioned phase. Some of

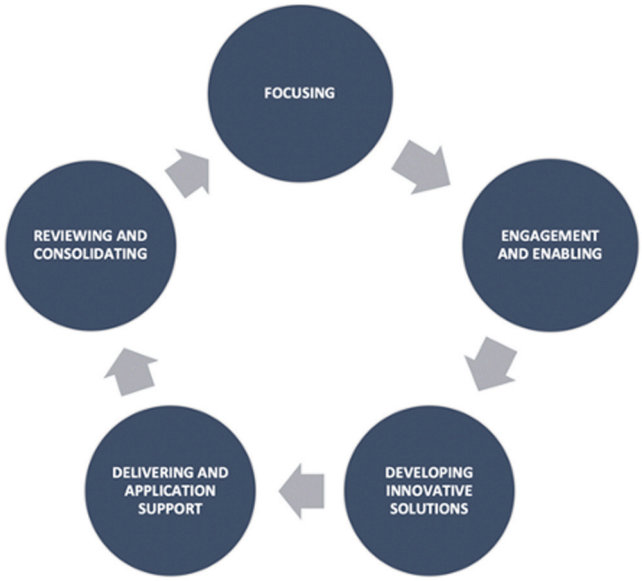

Fig. 1. "The Innovation Lab's management framework".

them (case study C, F) focus only on one or two processes.

Subsequently, they engage in collaborative dynamics with other innovation labs operating in the same ecosystem to support the participants involved in the entire innovation process. Consequently, the proposed model includes all the stages that an organisation should consider if it intends to develop innovative processes that benefit from intermediaries such as Innovation Labs. If an Innovation Lab cannot provide support at each stage, a collaboration between Innovation laboratories is required (Memon et al., 2018).

The model identifies five subsequent critical phases distinguishing the management of an Innovation Lab, i.e. *i) focusing, ii) engagement and enabling, iii) developing innovative solutions, iv) delivering and application support, and v) reviewing and consolidating.*

The *'Focusing'* phase defines strategic intentions, entails the development of a shared vision, and identifies the necessary resources to build a project plan. The second phase, namely *'Engagement and Enabling'*, is dedicated to activating mediation mechanisms to engage users and foster a working atmosphere that reduces hierarchies, provides incentives to empathise with given challenges, and stimulates creativity and innovation (Lewis and Moultrie, 2005; Schiuma and Santarsiero, 2023). Depending on the users' needs and the innovation goals pursued, Innovation Lab can also act as an innovation facilitator and provide opportunities for community building and partnerships with different stakeholders (Memon et al., 2018; Meyer et al., 2018). In the *'Developing innovative solutions'* phase the traditional steps of innovation management follow one another to use innovative projects to transform ideas into solutions or develop innovative skills and mindsets among users (Morel et al., 2016; Thorpe and Rhodes, 2018). At this stage, Innovation Labs should provide services such as mentoring, coaching, or facilitation sessions with end-users to get feedback and control the risk of failure. In addition, tools, equipment and technologies for testing and prototyping should be provided as part of the support.

After innovation development, the 'Delivering and Application Support' phase aims to deliver and/or apply the value created. In this phase, Innovation Labs provides consulting or mentoring services and supports users in developing time-to-market, go-to-market or growth hacking strategies, codifying the learned knowledge or improving routines. In addition, Innovation Lab can also support the building of bridges between companies and markets (Fecher et al., 2018). The last phase is about 'Reviewing and consolidating', where the activities are reviewed, and reflections are made. The final results of the activities are compared with the original objectives to gain insights from which to learn and develop innovation activities and strategies.

The "Innovation Lab's management framework" details the essential stages for an adequate management of these laboratories. This becomes increasingly important as Innovation Labs, originally conceived as closed research laboratories exclusively for internal client use, are gradually embracing a paradigm shift towards open and co-created innovation processes.

This evolved configuration of Labs is particularly beneficial for SMEs. Frequently lacking the internal capacity, culture and resources to independently implement DT and BMI initiatives, SMEs can now leverage the evolving nature of Innovation Labs to have the necessary support for business growth and scalability.

This is particularly valuable in tourism sector, inherently populated by SMEs, many of which are family businesses. These businesses, due to their culture and difficulties in terms of financial resources and skills, encounter significant difficulties in navigating the complexities of digitalization, innovating and adapting their dynamics to the evolving business landscape.

In this vein, the study has undertaken an AR project within a tourism enterprise to examine the validity of the proposed management framework and how tourism organisations can fruitfully leverage Innovation Lab to embark on DT and BM journeys.

5. Leveraging innovation lab for digital transformation and business model innovation journeys in tourism: an action research project

The AR project was carried out in collaboration with a tourism organisation whose goal is to enhance the ecological, scenic, artistic, historical and tourism resources of the Basilicata region.

Functioning as a destination developer, the organization specializes in formulating marketing strategies for food and wine product development. Its vision is to establish a robust tourism ecosystem in the Basilicata region that promotes the region's intrinsic value and culture, fostering international competitiveness. As part of this vision, the enterprise has in the pipeline the launch of a new innovative product: Lucanya, i.e. a digital tourism platform to promote the development of the territorial and tourist offer of the Basilicata region.

After the Covid-19 pandemic, the company decided to further invest on its digital innovation capacity and aligning its on-the-ground product offerings with the evolving market dynamics.

The company agreed to be involved in the AR project to improve and bring to market an innovative digital product that addresses current market challenges and trends, meeting the demands of consumers, and to experiment with new management approaches that support innovation, thereby overcoming internal barriers such as a lack of finances, skills, and resources.

From the research side, the AR project allowed the researchers to address the following themes: i) test the proposed management

Table 3
The AR project goals.

Researchers	Company
Is the Innovation Labs' management framework suitable for SMEs and tourism and cultural organizations?	How to launch a product/service in the market based on users' and demand's needs and calibrated on current context's trends and challenges?
Does the Innovation Labs' management framework effectively contribute to the digital innovation capacity development of tourism and cultural organizations?	How to develop a digital innovation capacity enabling managing technological advancements, keeping the pace of change to stay competitive?
How can the Innovation Lab foster Digital Transformation and Business Model Innovation in tourism and cultural organisations?	How to empower innovation filling internal organisation's gaps in terms of financial, human resources and time to dedicate to innovation?

framework, its phases and to assess their effectiveness in practice; ii) determine the efficacy of Innovation Labs in contributing to digital innovation capacity development, and fostering DT and BMI practices within tourism organisation; iii) prove the adaptability of the framework to SMEs as well as to the tourism organisations.

Table 3 summarises the main objectives of the AR project from both the researchers' and the company's perspectives.

5.1. The action research cycles

The AR project consisted of two cycles (see Table 4). The first cycle was used to investigate the company's commitment and involvement in the activities of the Innovation Lab.

Specifically, the first cycle aimed to demonstrate the validity of Innovation Lab's management framework for developing an organisation's digital innovation capacity and to evaluate the benefits of the organisation's participation in the Innovation Lab to identify the challenges and opportunities of the competitive scenario through user-centred, human-centred, and open innovation approaches. In addition, the first cycle aimed to prove the validity and potential of the activities of Innovation Labs in fostering open innovation, seeking networking opportunities, and promoting a continuous social innovation dynamic that enables continuous, repeated and validated learning mechanisms.

In the first cycle, the Innovation Lab was conceived as an open innovation lab that intermediated among various stakeholders and facilitated the creation of solutions in response to identified challenges; in the second cycle, it evolved into a firm-driven innovation lab internal to the partner organization, aimed at testing the selected solution until it was validated and implementable.

The phases of the AR cycles are described below.

Diagnosis 1: This phase encompassed all activities aimed at understanding the emerging and ongoing tourism scenario, as well as the attitudes and challenges arising from the pandemic. The activities have been conducted according to a human-centred and user-driven paradigm. Thus, a range of stakeholders (including Lucanya) have been engaged, i.e. entrepreneurs, operators, public institutions, tourists and local communities.

Plan 1: In this phase, after identifying the challenges within the sector, potential opportunities were pinpointed. Then, a divergent phase of creative and innovative thinking was initiated, during which participants examined the needs, particularly the unmet ones, that concealed business and innovation opportunities.

Action 1: The third phase is where actions and opportunities are transformed into solutions through creative and innovative activities. An online hackathon was organised involving many stakeholders. During the event, heterogeneous teams worked to develop and propose innovative solutions to the community.

Reflection 1: The last phase involved a series of reflections aimed to assess what worked and what did not and identifying areas of improvement. During this phase, reflections were made on the activation of mechanisms to develop new and enhanced processes, reinforcing strengths, and transforming weaknesses into success factors. Additionally, evaluations were conducted to assess the innovative solutions that emerged during the hackathon, deciding their suitability for the product that the company aimed to launch. This evaluation process underscored the need for a second cycle of Action Research, aimed to select, test and develop selected potential innovative solutions. The second cycle of AR was developed as follows.

Diagnosis II: The second cycle started with an initial diagnosis and observation phase conducted in collaboration with the company through focus groups to evaluate and finally select the best potential digital solutions that emerged during the online hackathon. Thus, the focus was on selecting those suitable for the company to innovate and expand the portfolio of services offered by the innovative product.

Plan II: This phase engaged internal employees, external professionals, and stakeholders who proposed the selected solutions. Thus, the previous hackathon enabled an open innovation dynamic and the possibility of finding partners to optimise resources and time-to-market. The involvement of stakeholders led to the creation of innovation teams for the planning and subsequent implementation of activities to test and evaluate the technical and economic feasibility of the idea. It also assessed the marketability of the solutions by comparing their characteristics with those required by the market and enabling adaptive processes to model solutions for Lucanya's mission and critical features.

Action II: This phase involved testing activities, employing iterative processes of continuous learning and validation with partners,

Table 4
AR cycles overview.

Action Research	Researcher	Participant organisation
Diagnosis I	Assessing the efficacy of emerging innovation paradigm	Context analysis to detect challenges and unsatisfied needs
Plan I	Focusing on the relevance of engagement and working climate prone to innovation	Transforming challenges into opportunities
Action I	Digital innovation capacity development	Stimulating innovative thinking for Idea generation
Reflection I	Feedback for the analysis	Feedback on generated business ideas and
Diagnosis II	Focusing on brainstorming and internal diffusion of lessons learned during the cycle I	Ideas selection
Plan II	Assessing openness to innovation, networking	Forming innovation team
Action II	Focusing on lean approaches and iterative learning mechanisms	Testing, learning from users and developing solutions
Reflection II	Feedback for the analysis	Assessing products improvement and lessons learned

users, customers, and communities to gain deeper insights into the proposed solutions. Improved solutions have been then proposed to the Lucanya network to test interest in the new products or services. The outcome of this phase was the evaluation of the attractiveness of the proposed solutions as perceived by the network organisation, tourists, customers and the ecosystem in general. Solutions that gathered significant interest were then adapted to the platform's requirements and implemented in the digital platform with the support of the Innovation Lab facilitator and the technical assistance of the involved stakeholders.

Proposing new solutions to the network brought about opportunities for DT and BMI for both the network and the platform. Lucanya was initially conceived as a B2B digital platform whose core business depends on the fees paid by the network's organisation to access the platform. Users and consumers could use the platform as a showcase to gather information and interest in tourism offers and products. After this phase, thanks to the collected feedback and openness to partners and customers and the implementation of new digital services, the participating organisation was able to extend the platform in a b2c logic. Customers and travellers can therefore buy products, services and experiences they want directly on the platform. By adapting the services offered to the new norms in a pandemic, the platform can also use virtual experiences.

The inclusion in the network of actors not directly related to the tourism and culture sector but also from related sectors with expertise in digitalisation, business, consultancy, etc., has increased the platform's attractiveness. In this way, Lucanya has evolved into a relational platform that promotes collaborations and opportunities and sets in motion a development dynamic for the entire regional tourism and culture sector.

Reflection II: In this last phase, researchers and practitioners reflected on the activities carried out during the second cycle and, generally, during all the phases of the project.

Applying a lean approach based on testing, measuring, learning, and building (Ries, 2011), the company has cultivated an innovative mindset and improved its digital innovation capacity. In fact, during the first cycle, several potential digital innovative solutions were generated by applying lean approaches based on open innovation, networking, human-centred and user-driven dynamics. With these solutions and the support of researchers, the company's employees then had the opportunity to apply and develop their digital innovation skills while working on adapting the solutions to Lucanya. Therefore, new, improved solutions emerged in the early stages of the second AR cycle, during focus groups where employees brainstormed on proposed digital innovations.

Furthermore, a culture of continuous and iterative learning was encouraged. Activities such as comparison, engagement, sharing feedback, enabling acceptance and dissemination of new ideas actively contributed to the development of learning mechanisms that provided the opportunity for independent improvement of the generated solutions, thereby enhancing the competitiveness and attractiveness of the products.

6. Discussion

Several studies have explored the role of Innovation Labs as catalyst of innovation. However, the analysis of this management initiative in the context of the tourism sector is still limited. Furthermore, the managerial dynamics of Innovation Labs have not received adequate attention. This study has attempted to addresses these gaps through multiple case studies and an action research project. The research explores the phenomenon of Innovation Labs, analyzing their management characteristics and their effective support for tourism organizations on embarking DT and business model innovation journey.

6.1. Evolution and role of innovation labs

From the analysis of the case studies, it appears that in contrast to previous studies predominantly viewing Innovation Labs as physical spaces dedicated to innovation (Bloom and Faulkner, 2016; D'Auria et al., 2017; Schmidt and Brinks, 2017; Magadley and Birdi, 2009), the importance of the structural component is currently decreasing.

There are several reasons for this. Firstly, there has been a transformation in the dynamics of the competitive environment. With technological advances, hybrid configurations of innovation labs that offer remote services are gaining importance. Collaborating with potential partners, experts in a particular field, and located on the other side of the world and unreachable has become easier. Moreover, the services offered by Innovation Lab, especially related to training and ideation, have become significantly more scalable, reaching a broader audience as participants from a distance can now engage with them.

In addition, the importance of physical space is also diminishing because managers have previously viewed them primarily as showcase venues rather than workspaces conducive to innovation. Therefore, innovation labs have often been perceived as separate organisational units where cutting-edge technologies and breakthrough tools were on display and where scientists, experts and geeks lock themselves away to invent new solutions. The strategic vision associated with ongoing innovative activities was not understood and shared with the rest of the organisation. The resulting innovations were often not understood and therefore not embraced by the rest of the organisation, leading to the failure of the initiatives. In addition, maintaining a closed approach to the external environment often resulted in innovative solutions developed in the form of new products and/or services that failed to consider market demand, thereby heightening the risk of failure. Therefore, it was essential to reconfigure the concept of Innovation Lab from a new perspective in which space is viewed more metaphorically.

Finally, all the laboratories studied were configured as relational platforms to facilitate connections with the ecosystem in which the companies operated. This is mainly to foster open innovation approaches and activate continuous, iterative learning processes with consumers and stakeholders. Therefore, new configurations of Innovation Labs consider space as a physical place but at the same time as a virtual and relational one, where organisational climate, ability to involve participants, and the attitude of perceiving the laboratory as an internal and open organisational unit are more crucial features. They can be conceived a management initiative, aiming

to create an innovative space - which can take the form of a physical, virtual or hybrid environment – fostering creative and innovative thinking, promoting and supporting user-driven and open innovation approaches to facilitate stakeholders engagement in innovations processes, to understand users' needs better, to drive technology transformation, to imagine and to define innovation opportunities, and to develop new business solutions capturing and delivering value.

This evolved configuration of Labs is particularly advantageous for SMEs that also represent typical configuration for tourism organisations. Frequently lacking the internal capability, culture and resources to autonomously implement DT and BMI initiatives, tourism organisations can leverage the evolving nature of Innovation Labs to have support for business growth and innovation.

6.2. Management processes and framework

The comparative analysis of the case studies has also shed light on some peculiar management processes characterising an Innovation Lab. These processes define the phases of the proposed "Innovation Lab's management framework", i.e. i) focusing, ii) engagement and enabling, iii) developing innovative solutions, iv) delivering and application support, and v) reviewing and consolidating. The model encompasses all the stages that an organization should take into account if it aims to develop innovative processes with the involvement of intermediaries like Innovation Labs. If an Innovation Lab cannot provide support at each stage, a collaboration between Innovation laboratories becomes necessary.

The relevance of Innovation Lab as catalyser of Digital Innovation Capacity, DT, and BMI in organisations, was evident in the AR project.

The AR Project has demonstrated how the Innovation Lab contributes to the development of organisation's digital innovation capacity, intended as *"the internal potential of a firm to generate new ideas, identify new market opportunities and implement marketable innovations by leveraging on existing resources of capabilities"* (Neely and Hii, 2012, p. 6).

The Innovation Lab's contributions to the development of digital innovation capacity can be examined through three key perspectives: marketing, management, and technology. These perspectives align with the considerations of various scholars who studied innovation capacity (Nonaka and Takeuchi, 1995; Neely and Hii, 2012; Szeto, 2000).

From the marketing perspective, Innovation Labs contribute to analyse the market and the context to understand the dynamics and challenges that arise. This approach enables a user-centred approach to be maintained throughout the cycle, ensuring that strategic decisions and the solutions to be developed and implemented align with the user and market needs. In this way, the risk of failure in producing marketable products, services and processes is controlled. For example, thanks to Innovation Lab, while participating in the webinars, the company was able to identify the unmet needs of the users and the market, which stimulated the development and implementation of new services within the prototype of the platform. These new services were then co-created with the users, who could participate personally in the tests and provide helpful feedback to make the services even more marketable.

From the management perspective, Innovation Lab proves to be a valuable model to help organisations better manage the available resources or to act as a facilitator or networking platform to seek profitable and necessary collaborations for the development of innovative solutions useful for the development of the organisation and the creation of value for stakeholders and the ecosystem. From this point of view, the research has shown how lean, open innovation and user-centric approaches, as well as the creation of an innovation-friendly organisational climate that considers failure as an opportunity for growth and learning, have proven to be very helpful in improving and/or systematising the resources available and necessary for the activation of development dynamics. In particular, during the research, the company was able to activate new collaborations with external actors that made it possible to optimise internal processes and create more profitable services that could be implemented on the platform. At the same time, it became possible to develop and implement new services and offers that completely renewed the planned initially business model.

Finally, from the technology perspective, the project highlighted that Innovation can foster the dynamism of DT and enhance the organization's ability to implement and manage emerging technologies continually entering the market.

The organisation involved in the AR project has recognised the need to implement fully digital services that were previously carried out traditionally. For example, before the project, the company's platform only served as a showcase to promote the tours and inform visitors about the possibility to book them. Working with the Innovation Lab company tested the introduction of virtual tours that can be used directly from the platform. More generally the company acquired the ability to manage and adapt to new emerging technologies, securing the ability to control the pace of change and take advantage of the new opportunities that technological progress suddenly offers. Moreover, by ensuring state-of-the-art services that meet the travellers' needs, the attractiveness of the destination is increased, thus adding value to the entire ecosystem of the company. The organisation, thus, acting as a territorial tourism platform has also become more attractive to client companies, which are encouraged to be present on the platform to benefit from the support in providing cutting-edge services.

By keeping a constant eye on market developments, consumer habits and changing demand, and adopting appropriate approaches to consciously embrace ever-evolving technologies, the organisation will be more resilient and inclined to offer marketable solutions. At the same time, by opening the labs to the external ecosystem, the company will be able to enter into collaborations and benefit from myriad opportunities to increase productivity and competitiveness.

6.3. Practical implications and benefits for tourism organisations

The AR project also highlighted that Innovation Labs can be an ideal means to promote the democratisation of innovation within the tourism sector. They can function as a tool to bolster the innovation and BMI processes for SMEs at large, especially those facing pronounced barriers to innovation. Similarly, it is also suitable to support the processes of DT and democratisation of technologies

within tourism organisations. This is particular important, as innovation in tourism is inseparable from the digital realm.

A further pivotal aspect underscoring the potential of developing Innovation Labs in tourism showed in the AR project, is their role as platforms for opportunity exploration, co-creation, networking, and collaboration. Innovation Lab can facilitate the establishment of a territorial ecosystem and networks. In the tourism industry, more so than in other sectors, fostering dialogue among sector stakeholders and promoting public-private partnerships is a crucial strategic factor for development.

In this regard, in the second AR cycle, the company tested the implementation of virtual tours directly accessible from the platform. Previously, the platform functioned solely as a showcase, promoting tours and informing visitors that there was an option to book them. This transformation not only granted the company the capability to adapt to new emerging technologies but also empowered it to control the pace of change and take advantage of the new opportunities arising from sudden technological advancements. Moreover, it indirectly contributed to the growth of the entire regional tourism ecosystem, enhancing its competitiveness. By providing cutting-edge services that meet the needs of travellers, the destination's attractiveness is amplified, consequently increasing the overall value of the ecosystem.

Innovation Labs in the tourism-cultural sector can serve, indeed, as a catalyst for democratising innovation, promoting DT and, fostering the development of individual, organisational and ecosystem digital innovation capacity.

7. Conclusion

To ensure the success of DT BMI, companies must actively develop and implement a step-by-step innovation strategy that aligns with their strategic vision and employee ambitions. Innovation Labs have emerged as a valuable organizational practice that can help companies meet these needs by developing innovation strategies and promoting digital adoption.

Through multiple case studies and an AR project, this research has explored the phenomenon of Innovation Labs, delving into their management characteristics and how they support organizations in their digital transformation and business model innovation journeys. The AR project focused on the tourism sector, aiming to understand how an Innovation Lab can contribute to the development of digital innovation capacity, DT, and BMI in tourism organizations.

From a *theoretical perspective*, the analysis of the case studies provided a deeper understanding of the management dynamics of Innovation Labs. This led to the proposal of an Innovation Labs management framework, offering both scholars and practitioners theoretical and practical insights into the development and management of these initiatives. The AR project enriched the theories of innovation management in tourism by highlighting the role of Innovation Labs in enhancing the innovative capacity of tourism organizations. It demonstrated that Innovation Labs could help democratize technology and innovation within the tourism sector, particularly for SMEs. The AR project also emphasized the role of Innovation Labs as platforms for exploring opportunities, fostering co-creation, enabling networking, facilitating collaboration, and establishing territorial ecosystems and networks.

This research has significant *practical implications*. It provides managers and practitioners with a comprehensive overview of the key dimensions to consider when designing and managing an Innovation Lab to develop digital innovation capacity and promote DT and BMI in organizations, particularly within the tourism sector. Managers and practitioners are equipped with a framework to support the design and execution of digital innovation journeys aimed at creating marketable digital solutions, improving performance, and fostering a mindset of continuous learning and innovation.

From the AR project, managers and practitioners can gather insights on how to:

i) Improve and adapt pipeline solutions or launch products or services aligned with market trends and user needs; ii) Engage employees, users, and stakeholders in co-creation activities to validate pipeline solutions; iii) Stimulate idea generation for DT and BMI; iv) Promote innovation during times of crisis; v) Develop attitudes for continuous innovation.

This research also has implications for *public policy*. Policymakers can play a crucial role in fostering innovation and digital transformation, especially within the tourism sector, by supporting the creation and funding of Innovation Labs. Public policies can be designed to facilitate collaboration between the public and private sectors, provide financial incentives, and support training programs. These policies can help overcome barriers to innovation and digital transformation, particularly for SMEs, which often lack the internal resources and capabilities to innovate independently.

The research has some *limitations*, mainly related to the methods used, which must be acknowledged.

The analysis of multiple case studies may limit generalisation and validation. In this respect, the nine analysed Innovation Labs, focusing on a single country (Finland), may not guarantee a comprehensive sample that allows generalisation to other laboratories in other contexts.

Aware of this limitation, the AR was conducted in parallel with the analysis of the multiple case studies to validate the framework by using the knowledge already gained.

AR also has limitations. In particular, it would have been appropriate to conduct the third cycle to focus on the impacts that the Innovation Lab generates, even in the long term. Therefore, it has not been possible to verify the value of the solutions created and implemented in the company after the second AR cycle. Finally, it has not been possible to demonstrate the actual development of a digital innovation capacity measurable by the volume of new solutions or opportunities created in the long term.

These limitations address *future research*. Further empirical research, including quantitative research, could expand the sample and provide comprehensive validation of the framework. Many Innovation Lab's managers or experts could be interviewed in a global survey to operationalise the dimensions identified in the model. In addition, a new AR cycle or a new comprehensive AR project should be conducted to complete the current research. In this context, it might be interesting to focus on the evaluation dimensions of Innovation Labs.

Further studies might require the identification of key performance indicators and metrics that allow a comprehensive evaluation

of Innovation Labs activities and relate to each phase of the Innovation Labs' management framework. Similarly, it might be interesting to develop robust indices to assess the maturity of organisations in terms of digital innovation capacity, DT and Business Model sustainability. Therefore, these indices could represent the assessment tools that motivate and address Innovation Labs' interventions and organisations' development strategies.

CRediT authorship contribution statement

Daniela Carlucci: Writing – review & editing, Conceptualization. **Francesco Santarsiero:** Writing – original draft, Methodology, Conceptualization. **Giovanni Schiuma:** Writing – review & editing, Supervision.

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