Creating private and public value in data-related management projects: a cross-border case study from Switzerland and Italy

Elide Garbani-Nerini
Faculty of Communication, Culture and Society
USI Università della Svizzera italiana
Lugano, Switzerland
elide.garbani.nerini@usi.ch

Elena Marchiori
Faculty of Communication, Culture and Society
USI Università della Svizzera italiana
Lugano, Switzerland
elena.marchiori@usi.ch

Nadzeya Sabatini
Faculty of Management and Economics
Gdansk University of Technology
Gdansk, Poland
nadzeya.sabatini@pg.edu.pl

Lorenzo Cantoni
Faculty of Communication, Culture and Society
USI Università della Svizzera italiana
Lugano, Switzerland
lorenzo.cantoni@usi.ch

ABSTRACT

The literature in the field of smart cities shows a continuous emphasis and interest in the topic of big data due to the extensive use of Information and Communication Technologies by public and private institutions within each city. There is undoubtedly value in big data: in data lie insights on the city, its stakeholders, citizens, products, and services. Challenges, though, lie in data's variety, volume, and velocity, but also in managing them, considering the complex interplay between stakeholders inside a city or a country. Another layer of complexity is added when we consider a smart city as a smart destination where the visitor - often an international tourist - becomes an additional stakeholder of a smart city bringing in additional data. Such challenges, though, are even stronger when tourists do not stop at geographical borders: smart destinations become cross-border destinations. While there is a physical border between them, but most importantly, a legal difference in how data should be collected, stored, managed, and re-used [56, 59], data flows do not stop at this border. This complexity has to be managed both by governmental and tourism agencies. However, the literature between eGovernment and tourism is often theoretical in nature, and while it highlights the potential benefits of smart destinations and data-management processes, it does not provide detailed guidelines on how to implement these concepts in practice [41], especially in the context of cross-border smart destinations. With regards to this, not only has the need for guidelines risen to help tourism destinations tackle smart data- and technology-related projects, but also to define how stakeholders can come together to determine data policies and governance in order to create private as well as public value [60]. This paper responds to such a need by presenting the results of a cross-border research project conducted in Switzerland and Italy, where the model of a smart destination's structure proposed by Ivars-Baidal et al. [35] has been applied, and its dimensions have been operationalized in a data-related management project. This allowed the authors to understand how to create public and private value managing data flows in a cross-border context, while also elaborating on the model reflecting on data's dual role as a starting point but also as a central component impacting other dimensions.

dg.o 2024, June 11–14, 2024, Taipei, Taiwan

ACM ISBN 979-8-4007-0988-3/24/06
https://doi.org/10.1145/3657054.3657275

CCS CONCEPTS

• **Information systems** → Data management systems; Database design and models; Information storage systems; World Wide Web; Web applications.

KEYWORDS

smart destination, smart city, data management, cross-border government, data-driven services, big data

ACM Reference Format:
Elide Garbani-Nerini, Elena Marchiori, Nadzeya Sabatini, and Lorenzo Cantoni. 2024. Creating private and public value in data-related management projects: a cross-border case study from Switzerland and Italy. In *25th Annual International Conference on Digital Government Research (dg.o 2024), June 11–14, 2024, Taipei, Taiwan.* ACM, New York, NY, USA, 9 pages. https://doi.org/10.1145/3657054.3657275

1 INTRODUCTION

Cities are complex systems, marked by a constantly growing number of interconnected citizens and businesses [49] and their related challenges. This complexity has led to the introduction and adoption of the concept of 'smart cities' as a new paradigm for innovative management and sustainable socio-economic growth [5, 31]. The term 'smart' can be intended in different ways and finds a meaning in different contexts, from marketing to urban planning. However, no matter the interpretative context, according to the literature, technology is one of the core components of a smart city [48]. In this context, the value of smart cities lies in their ability to harness technology and innovation to create more sustainable, efficient, and inclusive living environments that enhance the well-being and prosperity of all its residents. Such value is mainly created within public-private collaboration environments, with a crucial role of multiple stakeholders [3, 58].

A smart city has a dual function not only as a place where residents live but also as a place that travelers visit: it can hence become a smart tourism destination. A tourism destination represents a specific location, a city, or a country, that offers a range of attractions, services, and experiences to visitors, contributing to the economic, social, and cultural vitality of the destination and its surrounding region. Many amenities and resources at the destination are used by both locals (citizens) and visitors (tourists). At the strategic level, tourism destinations are managed by Destination Management Organizations (DMOs) that are mainly governmental offices, such as Ministries of Tourism, tourism boards and tourism agencies that operate at the national, regional, or local level. Historically, DMOs have developed the following goals: coordinate private and public actors within the tourist industry, develop a unique image of the destination in the eyes of potential tourists, provide visitors with pre-trip and on-site comprehensive tourism information, engage residents in discussing tourism-development strategies, and provide a strategic vision for the destination's development [12]. With the realization of these goals, they ultimately aim at creating value for both visitors and citizens.

The 'smart destination' concept has been almost unanimously recognized, both in the academia and in the industry, as the right approach for destinations to face the impact that digital technologies are having on tourism [14, 39]. It builds on the same principles of a smart city: urban development, transportation, energy, healthcare, and governance to create a more efficient, sustainable, and livable environment, also including visitors in the discourse [15, 16, 22, 36, 53, 54]. More specifically, a smart destination can be defined as "an innovative tourist space, accessible to all, consolidated on a state-of-the-art technological infrastructure that guarantees the sustainable development of the territory, facilitates the interaction and integration of the visitor with the environment and increases the quality of the experience and the quality of the residents' life" [own translation, 54, p. 32].

In the smart destination ecosystem, technology is the connection between the physical and the digital world, a world where (big) data are fundamental and knowing how to exploit them is the key to intelligent decision-making, value creation, innovation, and competitiveness [26, 29, 61]. Multiple studies show how implementing smart solutions based on data can help actualize more relevant and sustainable practices [7, 24, 45]. This also applies to a destination, where solutions based on data can positively affect the overall planning and management of the destination itself [41]. Around data, however, several challenges arise. Data come from different sources, and are, hence, of diverse type (variety), of extensive amount (volume), and constantly generated (velocity). Effectively managing these challenges involves navigating the intricate dynamics among different governmental and private entities within a city or a country. Challenges arise even further when thinking that, especially in the past decades, technological advances and infrastructure developments, such as improved cross-border mobility between neighboring countries, have increased tourists' possibility and desire to visit more than one country in a single trip [43]. Data travels with tourists across borders, however, legislation and regulations do not, and this creates new dynamics and complexities in managing such data. Smart destinations are not necessarily bound by geographical borders anymore and networks need to be expanded between two or more countries. While the literature in the field of smart cities and smart destinations and their potential benefits for residents and tourists is growing [4, 11, 14, 22, 29, 42, 50], and so is the interest in personal data management and their transition across border, also due to the adherence of EU countries to the GDPR regulations and the European Commission's recent promotion of the Once Only Principle (OOP), there is a significant gap in providing clear and practical guidelines on how to effectively adopt smart destination principles for cross-border tourism destinations, especially when it comes to projects based on technology and data management. Furthermore, additional studies are needed to explore how stakeholders can come together to define data policies and governance to create public as well as private value [17]. Indeed, the literature in this field is often theoretical in nature, and while it highlights the potential benefits of smart destinations and data, it does not provide detailed guidelines on how to implement these concepts in practice [40]. This paper responds to this need by presenting the results of a cross-border research project conducted in Switzerland and Italy, where the model of smart destination structure proposed by Ivars-Baidal et al. [35] has been applied, and its dimensions have been operationalized in a data-related management project in a cross-border context.

2 DIGITAL GOVERNMENT IN TOURISM

Digital government plays a pivotal role in shaping the tourism ecosystem by providing essential infrastructure, services, and governance mechanisms that support the sustainable development and management of tourism destinations [32, 52]. By leveraging digital technologies and collaboration across sectors, governments can enhance the competitiveness, resilience, and inclusivity of their tourism sectors, ultimately benefiting tourists, local communities, and economies. Digital government and tourism are areas that are facing several challenges. In this context, as in Kalbaska et al. [41, p. 330], "future research should go beyond the mapping of existing interactions (among stakeholders) and examine how such interactions occur, how they increase or decelerate the performance of organizations in different national and institutional contexts, and how technology can enhance the performance of such organizations and the governance mechanisms that place them together". Another aspect to consider in the field of digital government is the lack of standardization and interoperability between digital systems and platforms [2]: this can make it more difficult for governments and businesses to share and access data.

Data privacy and security represent other recurrent issues [29, 62] to consider, as digital systems and platforms collect and store large amounts of personal and sensitive data: their lack or inefficiency can make it difficult for governments and businesses to generate trust and confidence in digital government and tourism services for citizens and visitors. Moreover, as underlined by Kalbaska et al. [41, p. 330], "empirical studies may evaluate additional aspects of digital government in the tourism sector, such as the security and privacy of tourism-related data and digital technology for green tourism".

Additionally, digital government and tourism also raise concerns related to data governance (intended as who can use the data and who manages the data) [36, 37, 41]: their lack or inefficiency can

pose challenges for governments and businesses in ensuring data collection, proper usages, accessibility to all stakeholders (institutions, private companies and citizens, including those who may have limited digital literacy or access to technology), and compliance with legal regulations and ethical dimensions.

3 SMART CITIES, SMART DESTINATIONS AND DATA

The smart cities discourse has been generating considerable interest for a few decades now [15], not only in academia but also among policy makers. To classify and rank smart cities, different models with respective dimensions, indicators, and standards have been proposed [28] and have evolved over time [15, 20] also with the contribution of educational institutions [33, 34], governmental (European Commission) and non-governmental bodies (ISO) [35], as well as consulting firms [1]. Similarly, in the tourism field, many models and frameworks were proposed that define and describe the concept of smart destination, listing its components, layers, and dimensions [8, 9, 13, 26, 29, 36, 55]. An example is the competition for the European Capital of Smart tourism, established in 2018 by the European Commission, which is awarded to European cities that meet specific requirements and standards [25].

Smart destinations are ecosystems [30], networks interconnected through technology where data coming from users, devices, and operations [44] flow carrying an enormous amount of information with them. As stated by Gretzel et al. [29, p. 181] the key for destinations lies in knowing how to "collect and aggregate/harness data derived from physical infrastructure, social connections, government/organizational sources and human bodies/minds in the combination with the use of advanced technologies to transform that data into on-site experiences and business value-propositions with a clear focus on efficiency, sustainability and experience enrichment". However, the literature lacks applicable guidelines and principles that are generalizable and can be used in the sector by practitioners when working with data. On the one hand, most studies on smart destinations are focused on specific technology solutions/type of data or case studies, and their results may not be transferable to other destinations [10, 19, 21, 46, 57]. On the other hand, the models proposed in the literature might be too broad in scope to be applied by tourism destinations to use technology and data in a smart way, improving their operations and enhancing the visitor experience. In addition, it has been shown in the literature that different stakeholders have different understanding of the concept of smart destination, even though some conceptual areas associated with the term are commonly shared by tourism practitioners [27]. When it comes to data-related practices, such as data collection and analysis, however, the differences are more evident [27], therefore, it becomes crucial to have more operational guidelines that allow destinations to adopt the principles of smartness in relation with data- and technology-related projects.

4 METHODOLOGY

Considering the gaps highlighted in the literature review, the central role that data have in smart destinations, and the need to tackle the challenges related to data-management projects in cross-border destinations to create value both for public and private stakeholders, citizens and visitors, the following research question was formulated:

- How can data flows be managed in cross-border contexts to create private and public value in smart cross-border destinations?

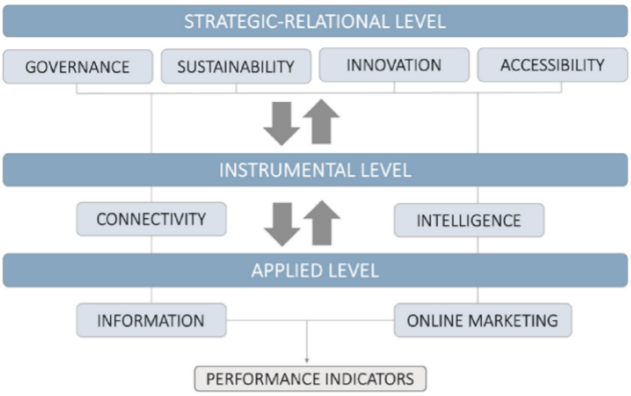

Figure 1: Smart destination model by Ivars-Baidal et al. [35], with three levels and their dimensions

In order to answer the research question, the authors have moved from the theoretical model conceptualizing a smart destination proposed by Ivars-Baidal et al. [35], outlined in Figure 1. In this model, a smart destination is represented along three levels: the strategic-relational level, the instrumental level, and the applied one. These levels are interrelated and present the essential dimensions and principles to foster and develop a smart destination. The strategic-relational level describes how a smart destination relies on governance and "is founded on planning, public-private collaboration and coordination in administration" all to develop tourism in an accessible, sustainable, and innovative way [35]. The instrumental level illustrates how a smart destination is based on digital connectivity, sensor technology and big data as its foundational elements, forming the infrastructure that supports information and intelligent systems. In Ivars-Baidal et al.'s [35] model, data is included in the instrumental level, while the applied level encompasses the solutions and outputs developed at a smart destination for marketing and management [35]. In our research project, data is considered as the starting point – first level. The model also presents a dimension that is external to the levels as it applies to the destination as a whole: performance indicators must be defined in order to evaluate smart destination initiatives [35]. This dimension was not considered in this research case as the evaluation phase of the project and its outputs has still to be conducted.

To answer the research question, this model was applied, and its dimensions were operationalized in a data-management project in a cross-border context. Insights on how to manage data flows in cross-border contexts to create public and private value were gathered through 10+ workshops, focus groups and meetings that were organized between the different stakeholders coming both from public and private entities and data scientists in Switzerland and Italy.

4.1 The research case: the Digital Destination Evolution System (DESy) project

The Digital Destination Evolution System (DESy) project was conducted between April 2019 and February 2023, as part of the Italy-Switzerland Interreg cross-border cooperation program for smart, sustainable, and inclusive growth. Two public agencies – tourism organizations were leading it: Agenzia turistica ticinese (Ticino Tourism, Cantonal DMO of Ticino, Switzerland) and Distretto Turistico dei Laghi (Piedmont's Tourist Reception and Promotion Agency, Italy) in collaboration with public stakeholders from the tourism industry, namely Agenzia di Accoglienza e Promozione Turistica Locale Provincia di Novara (Italy), Provincia Verbano-Cusio-Ossola (Italy), and from academia, namely USI-SUPSI Dalle Molle Institute for Artificial Intelligence and USI - Università della Svizzera italiana (Lugano, Switzerland). Local private tourism stakeholders were also involved in the project (e.g. about 50 hotels) as data providers. At the origin of this project there was the need of the two regions involved, Piedmont (Italy) and Ticino (Switzerland), to collaborate in a cross-border governance effort and join forces both in sharing know-how related to digital skills and data and information management connected with tourists and tourist flows. There is in fact evidence that tourists of these regions are not limited by geographical borders and move between Switzerland and Italy during their stay. Ultimately, the project had as its aim the creation of value for both private and public entities, visitors (tourists), and citizens of these two regions across two countries – Switzerland and Italy.

In the next chapter, the different levels of the model will be presented and operationalized, dimension per dimension, focusing on data's impact on them, while applying them to the context of cross-border environments. In each sub-chapter, first the results will be presented and then the encountered challenges will be tackled. Open questions that were not answered in the scope of the project will follow in the discussion section together with possible paths for future research.

5 RESULTS

5.1 Mapping the 'data estate' of a smart destination (applied level)

In the model by Ivars-Baidal et al. [35], this level encompasses two different dimensions: *information* and *online marketing*. The dimension of *online marketing* has not been tackled in this project, as online marketing was considered an example of one of the possible outputs of a smart data-management project.

As for the *information* dimension, the first step was to evaluate what types of data were accessible and relevant to understand tourists' behavior and preferences and from which touchpoints these data were coming. Therefore, a step back was made implying that data are the starting point instead of information, which is rather the output of data processing. In every destination, users, devices, and operations produce an incredible amount of data every second. These data contain insights for destination managers and stakeholders that can be used to support operations and managerial decisions. However, the constant increase in data sources and formats (variety), the amount of data that every source produces (volume), and the rapidity with which these data are generated (velocity) made it challenging to have an overview of the type of available data. At the same time, identifying the most interesting data sources and prioritizing them was a complex task, and so was understanding how to collect such data while ensuring privacy issues and respect for personal data, when necessary. Another challenge encountered in the project was connected to data quality. In fact, while first-party data (e.g. data either collected directly by the DMO) are owned by DMOs, which have then influence on the quality of the data collected (type, format, etc.), third-party data (e.g. data collected from external public and private stakeholders) are very often collected in a fragmented and different manner. This was the case, for example, of information collected and held by private companies in and outside the tourism industry such as tour operators, accommodation facilities, and telecommunication companies. This fragmentation led to a lack of visibility of the overall context on the part of public institutions formally mandated to promote tourism in the region. For this reason, it became crucial to map these different data sources and understand their data format, velocity, and volume, and create what was defined in the project as 'data estate'. Similarly to the concept of 'real estate', defined by Merriam-Webster as "property in buildings and land" [47], here the concept of 'data estate' can be used in the context of data management, by referring to an organization's data assets and their related infrastructure, data storage systems, and data management processes. Thus, the data estate of a tourism destination could be considered as all the data available that need to be mapped answering to specific questions:

- Where do the data come from?
- What data are available?
- Which format are the extracted data in? Are they aggregated?
- Are these historical data? Live data?
- What is the volume of the data available?

In the following, data that was analyzed in the context of the DESy project are listed.

- Newsletter data (open rate, click rate, etc.)
- Social media data
- Website analytics
- Data related to the tourist card available in Ticino: the "Ticino Ticket"
- Arrivals, departures, locations of tourists in the region
- Tourist accommodation statistics (number of establishments, rooms and beds)
- Hotel data (occupancy rate, pricing, etc.)
- Data from the cash register of public swimming pools
- Data on public transport (buses)
- Weather forecasts data
- Weather data

Table 1 illustrates how the above-mentioned questions were answered for some of the available datasets, mapping the data estate for a cross-border data-management project. This data estate was essential in providing an overview of the data available and their characteristics to start reflecting on which data could be useful to analyze and which use cases and possible projects could be worth investing time and budget on. In fact, quality has to be preferred

Table 1: Example of a data estate for a cross-border data-management project

Dataset	Data source	Data available	Data format	Data velocity	Data volume
Newsletter data	Mailchimp	E.g. number of recipients, successful deliveries, total opens, unique opens	Downloadable file with data CSV format	Continuous, after every newsletter sent	Depending on the regularity of the newsletter
Website analytics	Google Analytics	E.g. active users on site, pageviews, top referrals, top social traffic	Timeseries, downloadable as PDF, Google Sheet, Excel, etc.	Real-time overview	Depending on the website
Entrance tickets of tourism attractions	Own platform, "Ticino Ticket"	E.g. ticket ID, ticket language, check-in date, check-out date	Downloadable in CSV format	Daily	Depending on the number of tickets

over quantity and before starting any type of data-related project [6], the useful data sources need to be identified.

5.2 Connectivity and intelligence (instrumental level)

Once the data estate was mapped, the following step was to work on *connectivity* and *intelligence*, the two dimensions of the second level, according to Ivars-Baidal et al. [35]. In the DESy project, *connectivity* was intended as the possibility of connecting the different datasets, if possible, in one single platform. This dimension is very important, since smart destinations are interconnected ecosystems [30] and hence, also the data that are available should be connected to ensure a more complete picture of the situation and more insightful information. For this reason, the second phase of the DESy project aimed at setting up a single platform as an instrument for the analysis, while also combining the available datasets in order to obtain more informative insights on tourists' preferences and behavior.

Intelligence represented in the project the ability to derive some insights from the data, both in terms of instruments available for the analysis and human capital and skills.

Both dimensions posed several challenges. As mentioned beforehand, data were coming from different sources from both private and public entities, and had therefore been collected, stored, and aggregated in different ways. In a cross-border context, differences are more marked as every country has its own legislation in terms of data collection, storage, and management. This made it difficult to put different datasets in relation, even though data scientists provided the necessary intelligence for the analysis, both in terms of technology and tools and skills. The limitations encountered, especially when working with third-party data, were mainly connected to not being able to manage the data collection and storage process. Data were indeed often delivered as a one-time occurrence, representing a specific period in the past and not in real-time. The challenge here stemmed from the restricted applicability of historical data in making prompt decisions and conducting dynamic analysis. In general, historical data are useful to provide insights on patterns, but they might not capture the whole picture, including current developments or sudden changes, and might not be as relevant as they were when collected. They are then less effective for decision-making and might lead to misinformed strategies. Real-time data, on the other hand, allow DMOs to respond promptly to changing circumstances, to make more informed decisions, and to adapt strategies based on current conditions. Furthermore, in the project, data were often delivered in an aggregated manner, also due to privacy concerns and GDPR, making it very difficult to conduct analyses that led to a more personalized communication and service provision. Third-party data were useful for a broader perspective, such as tourist flows or attraction preferences, but these statistics were based on aggregated data and did not show the individual tourist. Building the customer journey was thus challenging with third-party data or with the data that was currently available during the DESy project. What emerged is that there is not always enough maturity in companies regarding data collection, knowing which data to collect, how to collect it, and using diverse data from various sources. It was furthermore realized that connectivity was not only about datasets, but also about different owners of such datasets. This challenge will be elaborated in the next sub-paragraph.

5.3 Governance, sustainability, innovation, and accessibility (strategic-relational level)

At the strategic-relational level, the dimensions of the model that were considered within the DESy project were: *governance*, *sustainability*, *innovation*, and *accessibility*. As underlined by Kalbaska et al. [41], smart data projects need to be managed also at the strategic- relational-level, involving in particular the concept of *governance*. In the project, DMOs were considered as a central hub leading the project as, in a destination, they are the stakeholders that are most familiar with the private and public sector. However, a number of institutional partners were involved in the project: namely, two other public tourism stakeholders, two academic institutions, other regional destinations and private companies. The DESy project highlighted the crucial role of the team leader in coordinating all stakeholders. In fact, even with the best intentions of applying principles of sharing and balancing the various contributions, an inside mediator was needed to manage even simple meetings, deadlines, and facilitate decision making. Governance was not only a matter of leadership but also of data ownership: in fact, often data sources were owned by different stakeholders within the destination. Some examples: public transportation data were collected by public transport institutions, data on customers of hotels were collected by the hotels themselves, data related to tourist attractions were collected by several private stakeholders, etc. Understanding how such data could be related was therefore

not only a technological but ultimately a relational, and negotiation, challenge. A 'smart' use of data required, therefore, collaboration and agreements between the different stakeholders that own such data sources. This is always the case of a smart city/destination: however, when working in a cross-border context additional layers of complexity are added. Another important aspect was to establish clear policies and responsibilities for data governance, including ownership, access controls, and compliance.

Sustainability was intended as the ability of the DESy project to maintain its effectiveness, relevance, and integrity over time. Smart data projects are very often expensive, both in terms of time and economic resources. For this reason, they must be sustainable. In a sustainable and comprehensive approach to data management, key considerations included: ensuring data quality in terms of accuracy, completeness, and consistency through measures such as regular data cleansing and validation; designing scalable infrastructure and systems to accommodate future growth and changes in data volume and variety; ensuring compatibility and seamless integration with external systems for efficient data exchange; implementing robust measures to protect data privacy and security, including compliance with regulations and encryption techniques; ensuring that the destination has the needed resources to run and manage the project in the medium/long-term; fostering a culture of continuous improvement and innovation in data management practices, guided by regular monitoring and evaluation; engaging stakeholders across the organization in order to ensure alignment with their needs and to promote collaboration.

Another dimension in the strategic-relational level is *innovation*. This was a crucial dimension, which ensured that the project contributed to exploring new solutions regarding data collection, storage, management, analysis, and visualization. Furthermore, smart data-management projects should foster the growth of the whole destination, stimulating creativity, experimentation, and entrepreneurship among the different stakeholders, both private and public ones.

The DESy project was also conceived to ensure *accessibility* of data, which can be interpreted as granting both public and private stakeholders the possibility to leverage the data assets of a destination to make informed decisions, drive insights, and achieve their goals. To foster innovation, data and information must be shared, so that other stakeholders can benefit from the knowledge created by the project. This goes in the direction of smart destinations as ecosystems where all the players are connected and information comes in the form of open data [18, 30, 38, 51]. Again, security concerns were raised here: confidentiality, integrity and compliance with privacy regulations and standards had to be assured. Another point that can be mentioned here is competitiveness. Stakeholders were hesitant in sharing their data, as they perceived potential risks to their competitive advantage.

6 DISCUSSION AND CONCLUSION

The results of operationalizing a smart destination model to a cross-border data-management project allowed the authors to answer the research question and determine how data flows could be managed in this particular context to create private and public value. First, mapping the data estate allowed destination managers to have a sound starting point for the project and a good overview of the situation. Notably, challenges related to data quality and fragmentation, particularly concerning third-party data, accentuated the need for a robust data mapping process to establish a comprehensive data estate, while focusing on constantly increasing the quality of first-party data. This also granted constant visibility of what type of data were available and what datasets could be developed in the future. Furthermore, thanks to the data estate, stakeholders had access to and visibility of the progress and results of the smart project. Subsequently, efforts toward connectivity and intelligence emerged as critical, while aiming at integrating different datasets to derive actionable insights. However, navigating cross-border disparities in data legislation and collection practices posed notable challenges, requiring strategic alignment and negotiation among stakeholders. At the strategic level, the importance of clear policies, resource allocation, and collaborative frameworks was highlighted to ensure the longevity and efficacy of smart data projects. Sustainability underscored the importance of long-term viability and effectiveness in smart data projects, requiring ongoing investment in data quality, infrastructure, and stakeholder engagement. Innovation, meanwhile, emphasized the role of data projects in fostering creativity, experimentation, and entrepreneurship within the destination ecosystems. Finally, accessibility highlighted the need for data democratization while addressing security and competitiveness concerns associated with data sharing.

In reflecting on the findings of this study, it became clear that data were not merely a starting point but indeed a central component that permeated every dimension of the model. While the project initially focused on mapping the data estate of a smart destination, it became increasingly apparent that data exerted a significant influence on each dimension explored. Data quality, accessibility, and interoperability directly impacted connectivity and intelligence efforts, shaping the effectiveness of data integration and insights derivation. Data governance considerations, such as usage and privacy, profoundly influenced strategic decision-making and stakeholder collaboration, highlighting the interconnectedness between data management practices and governance structures. Sustainability and innovation were also impacted by data-related challenges and opportunities. Sustainable data management practices, including ongoing investment in data quality and infrastructure, were crucial for ensuring the long-term viability and effectiveness of the project. Similarly, innovation in data collection, analysis, and utilization could drive creative experimentation and entrepreneurship within destination ecosystems, underscoring the transformative potential of data-driven insights.

A last reflection needs to be made on the inclusivity of this approach, especially for smaller destinations that might have less budgets for such projects. Indeed, as highlighted by the study of Garbani-Nerini et al. [27], the adoption of the smart paradigm for different tourism destinations may have different interpretations and may not be fully feasible due to the technological, skills and governance limitations that a tourism destination may have. Different networks have different approaches to the idea and realization of smart destination projects [27]. However, an approach such as the one proposed in this study might prove itself helpful in overcoming these obstacles: having smart projects roadmaps would guarantee access to and visibility of the progress and results. This could also

encourage other stakeholders to join a smart project specifically because they follow its developments and there is transparency of what requirements are needed to participate. Here, a change in perspective is suggested: it is no longer the tourist destination that asks the stakeholders what they can do, but each individual stakeholder contributes to a smart project by knowing their data estate, what they can do in the collaborative context of a smart destination and their innovative contribution to the ecosystem. This would also provide tools for advancing and clarifying what needs to be done to improve infrastructure and the skills/knowledge of human resources, as well as the economic resources available within a tourism destination.

This research has implications both for academia and practitioners. On the one hand, it expands the literature on smart destinations, by reflecting on the applicability of models and providing insights on the specific but increasingly common context of cross-country projects. It further contributes to the literature by extending the application of the model by Ivars-Baidal et al. [35] and introducing the new concept of 'data estate' to describe an organization's data assets and their related infrastructure and data storage system. On the other hand, it gives the industry an idea of what should be done when facing smart data- and technology-related projects, highlighting how to manage data flows to create private and public value by fostering collaboration between the different stakeholders at a destination, and how to interpret models in an applied and operational way, by bringing a practical contribution to all destination managers who wish to address the topic of cross-border smart destination data-management.

Open questions arising from this study pave the way for future research endeavors, particularly in testing and refining the elaborated model with the data estate as the starting point and data permeating every dimension of the model. Moving forward, it is imperative to foster closer collaboration between academia, governments, and industry at large, leveraging insights from all domains to provide operational guidance on theoretical concepts. Furthermore, the complexities surrounding data privacy, particularly in the context of cross-border data management, present significant challenges and raise crucial considerations not only at the instrumental-data level but also at the strategic-relational level. Future investigations should delve deeper into these issues to develop robust frameworks in order to effectively address data privacy concerns. Additionally, exploring the evolution towards open data represents the next frontier in advancing data management practices within smart destination ecosystems. Embracing open data principles holds the potential to democratize access to valuable insights and foster greater transparency and collaboration among stakeholders, ultimately driving innovation and sustainable development within the cross-border smart destination context. To complement this, a future critical analysis could explore issues of equity, ethics, power dynamics, technological solutionism, and community engagement to offer a more nuanced understanding of the opportunities and challenges associated with these initiatives.

ACKNOWLEDGMENTS

The work described in this paper was funded by the DESy (Digital Destination Evolution System) Interreg Italy-Switzerland Project.

REFERENCES

[1] Vito Albino, Umberto Berardi, and Rosa Maria Dangelico. 2015. Smart Cities: Definitions, dimensions, performance, and initiatives. Journal of Urban Technology 22, 1, 3-21. https://doi.org/10.1080/10630732.2014.942092

[2] Mohammed Al-Husban, and Carl Adams. 2014. Connected Services Delivery Framework: Towards Interoperable Government. In Mahmood Zaigham (ed.), Emerging Mobile and Web 2.0 Technologies for Connected E-Government. Hershey, PA: IGI Global, 50-75. https://doi.org/10.4018/978-1-4666-6082-3

[3] Karin Axelsson, and Malin Granath. 2018. Stakeholders' stake and relation to smartness in smart city development: Insights from a Swedish city planning project. Government Information Quarterly 35, 4, 693-702. https://doi.org/10.1016/j.giq.2018.09.001

[4] Rodolfo Baggio, and Miriam Scaglione. 2018. Strategic visitor flows and destination management organization. Information Technology and Tourism 18, 3, 29-42. https://doi.org/10.1007/s40558-017-0096-1

[5] Sabina Baraniewicz-Kotasińska. 2022. Smart city. Four approaches to the concept of understanding. Urban Research & Practice 15, 3, 397-420. https://doi.org/10.1080/17535069.2020.1818817

[6] Carlo Batini, Anisa Rula, Monica Scannapieco, and Gianluigi Viscusi. 2015. From data quality to big data quality. Journal of Database Management (JDM) 26, 1, 60-82. https://doi.org/10.4018/jdm.2015010103

[7] Simon Elias Bibri. 2018. The IoT for smart sustainable cities of the future: An analytical framework for sensor-based big data applications for environmental sustainability. Sustainable Cities and Society 38, 230-253. https://doi.org/10.1016/j.scs.2017.12.034

[8] Kim Boes, Dimitrios Buhalis, and Alessandro Inversini. 2015. Conceptualising smart tourism destination dimensions. In Iis Tussyadiah, and Alessandro Inversini (eds.), Information and Communication Technologies in Tourism 2015. Springer, Cham, 391-403. https://doi.org/10.1007/978-3-319-14343-9_2

[9] Kim Boes, Dimitrios Buhalis, and Alessandro Inversini. 2016. Smart tourism destinations: ecosystems for tourism destination competitiveness. International Journal of Tourism Cities 2, 2, 108-124. https://doi.org/10.1108/IJTC-12-2015-0032

[10] Tobias Brandt, Johannes Bendler, and Dirk Neumann. 2017. Social media analytics and value creation in urban smart tourism ecosystems. Information Management 54, 6, 703-713. https://doi.org/10.1016/j.im.2017.01.004

[11] Amber Brown, Jacqueline Kappes, and Joe Marks. 2013. Mitigating theme park crowding with incentives and information on mobile devices. Journal of Travel Research 52, 4, 426-436. https://doi.org/10.1177/0047287512475216

[12] Dimitrios Buhalis. 2000. Marketing the competitive destination of the future. Tourism management 21, 1, 97-116. https://doi.org/10.1016/S0261-5177(99)00095-3

[13] Dimitrios Buhalis, and Aditya Amaranggana. 2013. Smart Tourism Destinations. In Iis Tussyadiah, and Zheng Xiang (eds.), Information and Communication Technologies in Tourism 2014. Springer, Cham, 553-564. https://doi.org/10.1007/978-3-319-03973-2_40

[14] Dimitrios Buhalis, and Aditya Amaranggana. 2015. Smart tourism destinations enhancing tourism experience through personalisation of services. In Iis Tussyadiah, and Alessandro Inversini (eds.), Information and Communication Technologies in Tourism 2015. Springer, Cham, 377-389. https://doi.org/10.1007/978-3-319-14343-9

[15] Andrea Caragliu, Chiara Del Bo, and Peter Nijkamp. 2011. Smart cities in Europe. Journal of Urban Technology 18, 2, 65-82. https://doi.org/10.1080/10630732.2011.601117

[16] Walter Castelnovo, Gianluca Misuraca, and Alberto Savoldelli. 2016. Smart cities governance: The need for a holistic approach to assessing urban participatory policy making. Social Science Computer Review 34, 6, 724-739. https://doi.org/10.1177/0894439315611103

[17] Magdalena Ciesielska, and Aurora Sanchez Ortiz. 2023. Examining Failure of Smart City Public Value Co-Creation: The Role of Institutional Commitment. In Proceedings of the 24th Annual International Conference on Digital Government Research (dg.o 2023). Association for Computing Machinery, New York, NY, USA, 449-457. https://doi.org/10.1145/3209415.3209433

[18] Pin-Yu Chu, and Hsien-Lee Tseng. 2018. Open data in support of E-governance evaluation: A public value framework. In Proceedings of the 11th International Conference on Theory and Practice of Electronic Governance. Association for Computing Machinery, New York, NY, USA, 338-343. https://doi.org/10.1145/3209415.3209433

[19] Namho Chung, Heejeong Han, and Youhee Joun. 2015. Tourists' intention to visit a destination: The role of augmented reality (AR) application for a heritage site. Computers in Human Behavior 50, 588-599. https://doi.org/10.1016/j.chb.2015.02.068

[20] Boyd Cohen. 2014. The Smartest Cities In The World 2015: Methodology. Retrieved February 2, 2023 from https://www.fastcompany.com/3038818/the-smartest-cities-in-the-world-2015-methodology

[21] Pedro Manuel da Costa Liberato, Elisa Alén-González, and Dália Filipa Veloso de Azevedo Liberato. 2018. Digital technology in a smart tourist destination: The case of Porto. Journal of Urban Technology 25, 1, 75–97. https://doi.org/10.1080/10630732.2017.1413228

[22] Giacomo Del Chiappa, and Rodolfo Baggio. 2015. Knowledge transfer in smart tourism destinations: Analyzing the effects of a network structure. Journal of Destination Marketing & Management 4, 3, 145-150. http://dx.doi.org/10.1016/j.jdmm.2015.02.001

[23] Jelena Dorcic, Jelena Komsic, and Suzana Markovic. 2019. Mobile technologies and applications towards smart tourism – state of the art. Tourism Review 74, 1, 82-103. https://doi.org/10.1108/TR-07-2017-0121

[24] Noella Edelmann, and Shefali Virkar. 2023. The Impact of Sustainability on Co-Creation of Digital Public Services. Administrative Sciences 13, 2, 43-52. https://doi.org/10.3390/admsci13020043

[25] European Union. 2019. Competition for the European Capital of Smart Tourism. Guide for applicants. Retrieved February 2, 2023 from https://smart-tourism-capital.ec.europa.eu/guide-applicants_en

[26] Francisco Femenia-Serra, and Barbara Neuhofer. 2018. Smart tourism experiences: conceptualisation, key dimensions and research agenda. Investigaciones Regionales – Journal of Regional Research 42, 129-150.

[27] Elide Garbani-Nerini, Elena Marchiori, and Lorenzo Cantoni. 2022. Destinations and Data State-of-the-Art in Switzerland and Liechtenstein. In Jason L. Stienmetz, Berta Ferrer-Rosell, and David Massimo (eds.), Information and Communication Technologies in Tourism 2022. Springer, Cham, 200-212. https://doi.org/10.1007/978-3-030-94751-4_18

[28] Rudolf Giffinger, Christian Fertner, Hans Kramar, Robert Kalasek, Natasa Pichler Milanovic, and Evert Meijers. 2007. Smart cities – Ranking of European medium-sized cities. Vienna University of Technology. Retrieved April 30, 2024 from https://www.smart-cities.eu/download/smart_cities_final_report.pdf

[29] Ulrike Gretzel, Marianna Sigala, Zheng Xiang, and Chulmo Koo. 2015. Smart tourism: foundations and developments. Electronic Markets 25, 179-188. https://doi.org/10.1007/s12525-015-0196-8

[30] Ulrike Gretzel, Hannes Werthner, Chulmo Koo, and Carlos Lamsfus. 2015. Conceptual foundations for understanding smart tourism ecosystems. Computers in Human Behavior 50, 558-563. https://doi.org/10.1016/j.chb.2015.03.043

[31] Colin Harrison, and Ian Abbott Donnelly. 2011. A Theory of Smart Cities. In Proceedings of the 55th Annual Meeting of the ISSS – 2011, Hull, UK, 55, 1.

[32] Lea Hasenzahl, Nadzeya Kalbaska, and Lorenzo Cantoni. 2019. Digital transformation in the national tourism policies. In Proceedings of the 20th Annual International Conference on Digital Government Research (dg.o 2019). Association for Computing Machinery, New York, NY, USA, 417-424. https://doi.org/10.1145/3325112.3325225

[33] IESE. 2018. IESE Cities in Motion Index. Retrieved February 3, 2023 from https://media.iese.edu/research/pdfs/ST-0471-E.pdf

[34] IMD. 2023. Smart city observatory. Retrieved February 2, 2023 from https://www.imd.org/smart-city-observatory/home/

[35] Josep A. Ivars-Baidal, Marco A. Celdrán-Bernabeu, Francisco Femenia-Serra, José F. Perles-Ribes, and David Giner-Sánchez. 2021. Measuring the progress of smart destinations: The use of indicators as a management tool. Journal of Destination Marketing & Management 19. https://doi.org/10.1016/j.jdmm.2020.100531

[36] Josep A. Ivars-Baidal, Marco A. Celdrán-Bernabeu, Jose-Norberto Mazón, and Angel F. Perles-Ivars. 2017. Smart destinations and the evolution of ICTs: a new scenario for destination management? Current Issues in Tourism 22, 13, 1581-1600. https://doi.org/10.1080/13683500.2017.1388771

[37] Tomasz Janowski. 2015. Digital government evolution: From transformation to contextualization. Government Information Quarterly 32, 3, 221-236. https://doi.org/10.1016/j.giq.2015.07.001

[38] Marijn Janssen, Yannis Charalabidis, and Anneke Zuiderwijk. 2012. Benefits, adoption barriers and myths of open data and open government. Information Systems Management 29, 4, 258-268. https://doi.org/10.1080/10580530.2012.716740

[39] Dobrica Z. Jovicic. 2019. From the traditional understanding of tourism destination to the smart tourism destination. Current Issues in Tourism 22, 3, 276-282, https://doi.org/10.1080/13683500.2017.1313203

[40] Nadzeya Kalbaska, Tomasz Janowski, Elsa Estevez, and Lorenzo Cantoni. 2016. E-government relationships framework in the tourism domain. A first map. In Information and Communication Technologies in Tourism 2016, Proceedings of the International Conference in Bilbao, Spain. Springer, Cham, 73-86. https://doi.org/10.1007/978-3-319-28231-2_6

[41] Nadzeya Kalbaska, Tomasz Janowski, Elsa Estevez, and Lorenzo Cantoni. 2017. When digital government matters for tourism: a stakeholder analysis. Information Technology & Tourism 17, 315-333. https://doi.org/10.1007/s40558-017-0087-2

[42] Chulmo Koo, Seunghun Shin, Ulrike Gretzel, William Canon Hunter, and Namho Chung. 2016. Conceptualization of Smart Tourism Destination Competitiveness. Asia Pacific Journal of Information Systems 26, 4, 561-576. http://dx.doi.org/10.14329/apjis.2016.26.4.561

[43] Metin Kozak, and Dimitrios Buhalis. 2019. Cross–border tourism destination marketing: Prerequisites and critical success factors. Journal of Destination Marketing & Management 14. https://doi.org/10.1016/j.jdmm.2019

[44] Jingjing Li, Lizhi Xu, Ling Tang, Shouyang Wang, and Ling Li. 2018. Big data in tourism research: a literature review. Tourism Management 68, 301-323. https://doi.org/10.1016/j.tourman.2018.03.009

[45] Karl Löfgren, and C. William R. Webster. 2020. The value of Big Data in government: The case of 'smart cities'. Big Data & Society 7, 1. https://doi.org/10.1177/2053951720912775

[46] Estela Marine-Roig, and Salvador Anton Clavé. 2015. Tourism analytics with massive user-generated content: A case study of Barcelona. Journal of Destination Marketing & Management 4, 3, 162-172. http://doi.org/10.1016/j.jdmm.2015.06.004

[47] Merriam-Webster. 2024. Real estate. Retrieved April 30, 2024 from: https://www.merriam-webster.com/dictionary/real%20estate

[48] Taewoo Nam, and Theresa A. Pardo. 2011. Conceptualizing smart city with dimensions of technology, people, and institutions. In Proceedings of the 12th Annual International Digital Government Research Conference: Digital Government Innovation in Challenging Times (dg.o 2011). Association for Computing Machinery, New York, NY, USA, 282-291. https://doi.org/10.1145/2037556.2037602

[49] Paolo Neirotti, Alberto De Marco, Anna Corinna Cagliano, Giulio Mangano, and Francesco Scorrano. 2014. Current Trends in Smart City Initiatives: Some Stylised Facts. Cities, 38, 25-36. http://dx.doi.org/10.1016/j.cities.2013.12.010

[50] Barbara Neuhofer, Dimitrios Buhalis, and Adele Ladkin. 2012. Conceptualising technology enhanced destination experiences. Journal of Destination Marketing and Management 1, 1-2, 36-46. https://doi.org/10.1016/j.jdmm.2012.08.001

[51] Anastasija Nikiforova, Nina Rizun, Magdalena Ciesielska, Charalampos Alexopoulos, and Andrea Miletić. 2023. Towards High-Value Datasets determination for data-driven development: a systematic literature review. In Ida Lindgren, Csaba Csáki, Evangelos Kalampokis, Marijn Janssen, Gabriela Viale Pereira, Shefali Virkar, Efthimios Tambouris, and Anneke Zuiderwijk (eds.), Electronic Government. EGOV 2023. Lecture Notes in Computer Science, 14130. Springer, Cham, 221-229. https://doi.org/10.1007/978-3-031-41138-0_14

[52] Anna Picco-Schwendener, Nadzeya Kalbaska, Lea Hasenzahl, and Lorenzo Cantoni. 2022. e-Government and Tourism. In Zheng Xiang, Matthias Fuchs, Ulrike Gretzel, and Wolfram Höpken (eds.), Handbook of e-Tourism. Springer, Cham, 1629-1644. https://doi.org/10.1007/978-3-030-05324-6_101-2

[53] Nadzeya Sabatini. 2023. Tourism Governments and Solidarity: Can Destination Management Organizations be involved in a refugee crisis while exploiting their digital capabilities? In Proceedings of the 24th Annual International Conference on Digital Government Research (dg.o 2023). Association for Computing Machinery, New York, NY, USA, 646-647. https://doi.org/10.1145/3598469.3598568

[54] SEGITTUR. 2015. Libro Blanco Destinos Turísticos Inteligentes. Retrieved February 3, 2023 from https://www.segittur.es/destinos-turisticos-inteligentes/proyectos-destinos/libro-blanco-destinos-turisticos-inteligentes/

[55] Sanaz Shafiee, Ali Rajabzadeh Ghatari, Alireza Hasanzadeh, and Saeed Jahanyan. 2019. Developing a model for sustainable smart tourism destinations: A systematic review. Tourism Management Perspectives 31, 287-300. https://doi.org/10.1016/j.tmp.2019.06.002

[56] Arie Stoffelen, Dimitri Ioannides, and Dominique Vanneste. 2017. Obstacles to achieving cross-border tourism governance: A multi-scalar approach focusing on the German-Czech borderlands. Annals of Tourism Research 64, 126-138. https://doi.org/10.1016/j.annals.2017.03.003

[57] Yunchuan Sun, Houbing Song, Antonio J. Jara, and Rongfang Bie. 2016. Internet of Things and Big Data Analytics for Smart and Connected Communities. IEEE Access 4, 766-773. http://doi.org/10.1109/ACCESS.2016.2529723

[58] Gabriela Viale Pereira, Maria Alexandra Cunha, Thomas J. Lampoltshammer, Peter Parycek, and Maurício Gregianin Testa. 2017. Increasing collaboration and participation in smart city governance: A cross-case analysis of smart city initiatives. Information Technology for Development 23, 3, 526-553. https://doi.org/10.1080/02681102.2017.1353946

[59] Adi Weidenfeld. 2013. Tourism and cross border regional innovation systems. Annals of Tourism Research 42, 191-213. https://doi.org/10.1016/j.annals.2013.01.003

[60] Maria A. Wimmer. 2012. Integrated service modelling for online one-stop government. Electronic Markets 12, 3, 149-156. https://doi.org/10.1080/101967802320245910

[61] Zheng Xiang, and Daniel R. Fesenmaier. 2017. Big Data Analytics, Tourism Design and Smart Tourism. In Zheng Xiang, and Daniel R. Fesenmaier (eds.), Analytics in Smart Tourism Design. Tourism on the Verge. Springer, Cham, 299-307. https://doi.org/10.1007/978-3-319-44263-1_17

[62] Thomas Zefferer, Bernd Prunster, Christian Kollmann, Andreea Ancuta Corici, Lukas Alber, Roland Czerny, and Blaz Podgorelec. 2023. A Security-Evaluation Framework for Mobile Cross-Border e-Government Solutions. In Proceedings of the 24th Annual International Conference on Digital Government Research (dg.o 2023). Association for Computing Machinery, New York, NY, USA, 536-543.