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Original Scientific Article

Data Dreams vs. Reality: Bridging the Data Culture Gap in Small Cultural Destinations

Zuzana Kvítková[1]
Zdenka Petrů[2]
Kamila Tišlerová[3]

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Abstract: *Small cultural destinations face significant challenges in tourism data collection and analysis. This study aims to examine the data culture in smaller cultural destinations across selected countries using a triangulated methodology combining qualitative workshops, quantitative surveys, and content analysis. Data were collected from 99 DMOs and municipalities in Slovakia, the Czech Republic, Albania, Poland, and Hungary between 2022 and 2024. Results reveal an underdeveloped data culture characterised by limited financial resources, reliance on basic data sources (own questionnaires, social networks, and tourist information centres). The research revealed the existence of "aspirational data culture" and the "aspiration-reality gap". This consists mainly of technology aspiration versus real opportunities. While organisations desire advanced data collection methods, such as mobile/GSM data, most employ only basic analytical techniques, with some storing data without any analysis. Key barriers include insufficient funding, lack of institutional cooperation, and limited technical expertise. The study recommends standardised methodological frameworks, collaborative purchasing models, and centralised data-sharing platforms to bridge the data culture gap and enhance sustainable tourism management in cultural destinations.*

Keywords: *Data Culture, Cultural destinations, Tourism, DMOs*

JEL Classification: Z31, M15, M14

✉ zuzana.kvitkova@ambis.cz
[1] Ambis University, Lindnerova 575/1, 180 00 Praha 8, Czech Republic
[2] Ambis University, Lindnerova 575/1, 180 00 Praha 8, Czech Republic
[3] Ambis University, Lindnerova 575/1, 180 00 Praha 8, Czech Republic

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1. INTRODUCTION

Small cultural destinations constitute a unique segment of the tourism sector, characterised by limited geographic size, lower visitor volumes, and strong reliance on local cultural assets that play a vital role in preserving cultural heritage, traditions, and community identity (Richards, 2018; Timothy & Nyaupane, 2009). Unlike major urban centres, these destinations offer intimate, authentic experiences tied to local stakeholder participation and heritage safeguarding (UNWTO, 2018). In times when digital transformation, smart tourism destinations, and data-driven governance are discussed, small destinations might be "left behind" in these aspects.

Effective management and sustainable development depend heavily on tourism data availability and quality. For DMOs and municipal offices, systematic data collection is fundamental for understanding visitors´ profiles, monitoring flows, assessing economic impacts, and evaluating marketing initiatives (Baggio & Klobas, 2017; Morrison, 2013). Reliable data enables informed decisions, optimised resource allocation, and tailored tourism products (Gretzel et al., 2015). In resource-limited small destinations, data-driven management is crucial for allocating scarce resources, maximising investment effectiveness and supporting external funding applications (Dredge & Jenkins, 2016).

Transparent, evidence-based reporting fosters trust among communities, institutions, and businesses, providing foundations for participatory planning (Bramwell & Lane, 2011). This is essential where tourism impacts are felt more directly by residents and stakeholders. Data culture encompasses three interconnected dimensions: (1) technical capabilities (infrastructure, tools, skills), (2) organisational practices (data governance, processes, roles), and (3) cultural attributes (data literacy, trust in data, data-driven mindset) (Kiron et al., 2014). In small cultural destinations, these dimensions are constrained by resource limitations.

The theoretical gap this study addresses is the data culture concepts in resource-constrained tourism organisations, particularly in small cultural destinations, where traditional enterprise-focused frameworks may not be applied directly (Chen et al., 2012). The research question is formulated as follows:

RQ: "What is the situation with data collection in smaller cultural destinations in selected countries through the lenses of data culture?"

Based on the definition of data culture, the following sub-questions are formulated:
(1) What are the methods used,
(2) What are the methods desired,
(3) What barriers are encountered,
(4) What data analysis is employed, and
(5) What is the potential usage of the data?

The answers have been brought through a triangulation of qualitative analysis of focus groups (workshops), quantitative analysis, and content analysis. The main innovation of this paper is the application of the data culture framework to small cultural destinations, which are lacking in the literature. The results are not only an insight into the practice but also offer a significant theoretical contribution to this topic.

2. CHALLENGES AND NEEDS IN DATA COLLECTION FOR SMALL DESTINATIONS

Small cultural destinations face a unique constellation of challenges in the collection, management, and utilisation of tourism data. A primary obstacle is the limited financial and human capacity of small destinations, which makes it difficult to invest in advanced data- collection systems or conduct regular, large-scale surveys (Borowiecki et al., 2024). The costs associated with these technologies are often prohibitive, resulting in a reliance on traditional, less granular methods such as manual visitor counts or occasional surveys (European Commission et al., 2022). Small staff teams may lack the time or specialised expertise to conduct comprehensive data gathering and analysis (Baggio & Klobas, 2017; Morrison, 2013). Nevertheless, the commitment to data-driven management remains strong, as DMOs and municipalities seek innovative solutions.

Tourism data is inherently diverse, encompassing sources ranging from visitor registrations and financial transactions to social media analytics and geolocation data, further complicating the situation. Integrating such heterogeneous data streams into a coherent information system requires not only technical infrastructure but also specialised competencies in data harmonisation and analysis. These resources are typically scarce in small destinations, where human factors also play a significant role (Borowiecki et al., 2024; European Commission, 2022). The lack of common standards and interoperability protocols at the local level exacerbates these challenges, limiting the potential for data-driven management and evidence-based policy-making (Eurostat, 2017). Significant investments are more easily justified and absorbed in larger destinations with higher visitor volumes and greater public funding (European Commission et al., 2022). Small destinations risk digital exclusion, as they may lack the resources to participate in national or European data-sharing platforms or to implement smart tourism solutions at scale.

Another salient challenge is data privacy and governance. Especially data from mobile devices raises concerns about compliance with data protection regulations, such as the General Data Protection Regulation (GDPR) in the European Union. Small destinations often lack the legal expertise and institutional frameworks necessary to navigate these requirements, which can deter the adoption of innovative data sources.

A critical gap in the academic literature compounds these practical challenges. Most tourism research and methodological innovation have historically focused on large, resource-rich destinations, which are better equipped to participate in pilot projects and to adopt advanced data analytics (Borowiecki et al., 2024; Li et al., 2018). As a result, best practices and policy recommendations are often tailored to the needs of larger destinations, overlooking the specific circumstances and constraints of small, rural, or culturally unique locations. This paper aims to bridge the gap in the literature.

3. DATA CULTURE

The emerging topic of data culture/s has been identified and discussed across a broad spectrum of academic disciplines. Oliver et al. (2023) define the data culture as social, technical, and cultural characteristics, values, and practices that determine the nature of data production, generation, acquisition, cultivation, use, curation, preservation, sharing, and reuse by individuals, organisations, governments, and societies. They may co-exist and compete at multiple levels and are dynamic and normative in nature. The theoretical foundation of data culture in tourism organisations is built upon several established frameworks. Drawing from organisational culture theory (Schein, 2010), data culture represents a deeper layer of shared assumptions about the value of data and usage patterns.

Davenport and Patil's (2012) data-driven decision-making framework provides the operational dimension, while the Technology-Organization-Environment (TOE) framework (Tornatzky & Fleischer, 1990) explains the contextual factors influencing data culture adoption in small organisations. The importance of exploring and optimising data culture is increasingly recognised as crucial for innovation. Firms require a suitable organisational cultural orientation to fully capitalise on the benefits of big data variety and related analytical technologies (Hussinki et al., 2025).

While data-driven decision-making (DDDM) is increasingly recognised, many organisations struggle to fully implement and benefit from it (Mikalef et al., 2018). For small tourism organisations, this means focusing on accessible and affordable data analytics tools. Brynjolfsson, et al.'s (2011) research indicates that the impact of data-driven decision-making on a company's performance is significant. Output and productivity can be 5-6% higher than what would be expected given the company´s other investments and information technology usage. The avenue from data analysis to higher performance is, however, not straight. It is influenced by many diverse factors (Maroufkhani et al., 2019). This means that simply investing in data analytics tools does not guarantee improved performance. It is also important to train staff to interpret basic data trends (e.g., website traffic, booking patterns, customer feedback). For small tourism organisations, this suggests a need to carefully consider their specific context and align their data analytics efforts accordingly. A tailored approach is critical rather than a one-size-fits-all implementation of data analytics. Neuhofer et al. (2015) discuss how smart technologies enable service co-creation in tourism. Chuang (2023) conceptualizes the smart tourism service platforms and their role in value co-creation. Both implicitly rely on data sharing between tourists and tourism providers. Creating a culture where data informs choices about marketing, service offerings, and resource allocation is therefore crucial.

Several established frameworks and models are relevant in this area. Statistical Framework for Measuring the Sustainability of Tourism (SF-MST) was developed and recommended by UNWTO (UNWTO, 2022). The DIAMOND model for sustainable tourism development and Social Exchange Theory (SET) are useful for understanding stakeholder perceptions and impacts. Destination Management Information System (DMIS) is a comprehensive system that manages and integrates data related to a tourist destination, supporting both pre-trip and post-arrival information, including availability and booking services. DMIS facilitates data-driven decision-making for DMOs. There are also other recommendations for tourism data collection and/or sustainability monitoring, e.g., ETIS, TOURMIS. As already mentioned, they are mostly suitable for larger destinations (countries, regions) but not so much for smaller destinations at the town level.

4. RESEARCH AIM AND METHODOLOGY

The research question "What is the situation with data collection in smaller cultural destinations in V4 countries plus Albania through the lenses of data culture?" was formulated and necessitates an approach that captures breadth and depth of current practices, needs, and challenges. This study adopts a pragmatic research philosophy, employing mixed-methods triangulation (Creswell & Plano Clark, 2011; Koc & Boz, 2014). The sequential explanatory design proceeds from qualitative exploration (workshops) to quantitative validation (survey) and qualitative expansion (content analysis):

- **Qualitative workshops** with DMO staff and municipal officials to explore in-depth perceptions, motivations, and barriers related to data collection.
- **Quantitative analysis** of closed-ended (choice) survey questions to provide measurable insights into the prevalence of specific methods, desired improvements, and perceived barriers.
- **Content analysis** of open-ended survey responses to identify recurring themes, contextual factors, and innovative practices.

The workshops identified the challenging areas, and based on them, quantitative research was conducted to see how important the issues are and what the data culture is. This approach enables a comprehensive assessment of the five main aspects respecting data culture theory of data collection in small cultural destinations: (1) methods used, (2) methods desired, (3) barriers encountered, (4) data analysis employed, and (5) planned usage of the data. Data were collected in two stages between February 2022 and May 2024; methodological triangulation was achieved through the integration of findings from workshops, quantitative survey results, and qualitative content analysis.

A series of workshops was conducted in cultural destinations Kutná Hora, Litomyšl, Poznaň, Bardejov, Banska Stiavnica and Hercegkút. The structure of the topics was: (1) Is there any sustainability monitoring going on?, (2) What data sources/methods do you currently use?, (3) What are the barriers to sustainability monitoring/education/implementation of monitoring, (4) How would you like to use the data (for what purposes)?

A structured questionnaire was developed based on workshop findings and validated through expert review (international project team, 10 persons) and pilot testing (5 respondents, one in each country). The questionnaire measured five dimensions of data culture: collection methods, desired methods, barriers, analysis capabilities, and usage patterns. The questionnaire included both closed-ended and open-ended questions. The closed-ended items were analysed using descriptive statistics. The qualitative data from open-ended responses were analysed using a multi-stage qualitative content analysis approach. This process began with open coding, followed by the development of initial categories and conceptual groupings.

To ensure analytical rigour, the coding process was conducted in an iterative manner, meaning that codes and categories were repeatedly reviewed, compared, and refined throughout the analysis. This cyclical process allowed for the continuous improvement of category definitions and ensured consistency across the dataset. The final coding framework was validated through repeated internal review within the research team, where interpretations and category definitions were discussed and aligned until conceptual consensus was reached. This process enhanced the trustworthiness, transparency, and reliability of the qualitative findings.

A purposive sampling strategy was employed to select small cultural destinations meeting specific criteria: (1) UNESCO World Heritage status or equivalent cultural designation, (2) not the capital, (3) active DMO or municipal tourism management, and (4) located within V4 countries plus Albania. The exact sampling frame was determined through cultural heritage databases, resulting in 99 completed responses from organisations meeting the study criteria in Slovakia (26), the Czech Republic (23), Albania (21), Poland (18), and Hungary (11).

5. RESULTS

The workshops first addressed whether tourism data monitoring is conducted. Most destinations rely on basic data, such as accommodation statistics and length of stay, mostly from national statistical offices, but generally lack information on same-day visitors, visitor spending, and other economic data. Specific sustainability indicators (e.g., water use, waste, seasonality) are rarely tracked. The data sources and methods currently used are more diverse. Some destinations depend solely on national statistics, while others conduct their own surveys. Information centres frequently provide ticket sales data, but these often lack details and may cover multiple sites in one ticket, limiting the ability to segment by visitor type or origin. Only a few destinations use specialised data (e.g., mobile phone data), and also social media is mentioned, but social listening tools are not employed. Barriers

to monitoring include limited staff capacity, high workloads, and insufficient funding for professional data collection, with rare mentions of missing analytical skills. Fragmentation and weak collaboration between institutions, along with inconsistent institutional support and a lack of standardised data practices, further hinder progress. Data are often only available in aggregate forms, limiting detailed analysis. Strategic planning and marketing are generally underdeveloped. Response rates to data collection are low, and while some consider using social media for surveys, this remains underexplored. Regarding data usage, participants highlighted its importance for evidence-based argumentation, countering public criticism, and demonstrating that infrastructure investments serve both tourists and locals. Data also supports dialogues with political opposition and justifies public expenditures.

Second, based on the workshops, a quantitative research was conducted to see how important the issues are and what the data culture is, bringing the answers to questions (1) data collection methods used, (2) methods desired, (3) barriers encountered, (4) data analysis employed, and (5) planned usage of the data.

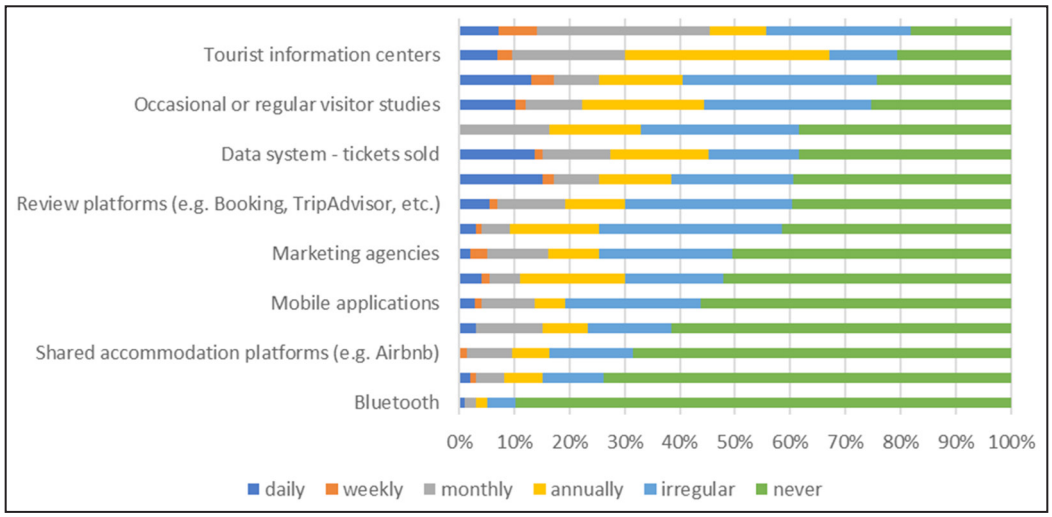

Figure 1. Data Sources for DMOs and Municipalities in Cultural Destinations
Source: Own calculations

The answer to the first question is presented on the graph, Figure 1: Data Sources for DMOs and Municipalities in Cultural Destinations. The graph presents the methods that the organisations (DMOs and municipalities) use. They actively use social networks and tourist information centres (more than 50% of them). More than 30% of the respondents use face-to-face questionnaires, visitor studies, data from businesses in the destination, ticketing systems, digital counters, review platforms, and mobile phone data tracking. The least used sources are Bluetooth connections and Wi-Fi access.

To answer question (2) on desired, we employed content analysis, resulting in the answers in 5 categories. The coding scheme is presented in Table 1: Categories from content analysis.

The results of content analysis are presented in Table 2: Content analysis, comprising category, sub-category, examples, and percentage of presence in the results. Each answer can mention none, one or more methods; in the rare cases where responses clearly combine categories, the mention is attributed to each mentioned category ("hybrid" is assigned if the answer is explicitly about combining, not just listing).

Table 1. Categories from content analysis

Category	Subcategory
Technology-Based	Mobile/GSM data, digital counters, cards, online/social media, payments
Direct Engagement	Surveys/questionnaires, interviews, enumerators
Institutional/Manual	TIC data, manual counts, business/ticket data
Aggregated/Secondary	Official statistics, external research studies
Hybrid/Combined	Multiple methods blended for comprehensive coverage

Source: Own processing

Table 2. Content analysis

Category	sub-category	examples	Percentage (%)	
Technology-based	Mobile/GSM/Telecom data	"mobile operators", "GSM data", "SIM card", "teleinformatics", real-time telecom, "data from mobile phones"	27	58
	Digital counters & Sensors	"digital counter", "traffic/people counter", "pedometer",	12	
	Digital visitor/ discount cards	"digital OravaCard", "digital visitor cards"	3	
	Online and social media	"online sources", "social networks", "review platforms", "online media"	9	
	Payment/ credit cards	"credit card", "payment card", "Visa/ Mastercard"	7	
Direct engagement	Surveys and questionnaires	"visitor survey", "questionnaire", "direct/ personal questions", "opinion surveys"	25	39
	Face-to-face interviews	"face-to-face interview", "oral interview", "focus groups"	10	
	Enumerators/ personal contact	"enumerators", "manual personal contact", "staff/volunteer collecting"	4	
Institutional/ manual	TIC data	"data from TIC", "Tourinform office"	8	30
	Manual data and records	"manual data collection", "manual counting", "records"	11	
	Business/ facility data	"accommodation facilities", "tax", "orders from websites", "event/business data", "ticket sales"	11	
Aggregated/ secondary	National or regional statistics	"Statistical office data", "CSO", "GUS", "DATACUBE", "NTAK", "state databases"	12	17
	Third-party/ external data	"marketing agency", "external research", "public database"	5	
Hybrid/ combined	Hybrid/ combined (explicit)	"ideal to combine methods", "combination of the above", "mixed-method", "triangulation"	7	7

Note: this was an open question, not compulsory; therefore the number of answers does not equal the number of respondents. In one answer, more methods can be mentioned.

Source: Own research (each category's percentage reflects how many of the 92 responses mention each method)

The most important key finding is the technology aspiration vs. reality gap in the practice of DMOs and municipalities. Organisations demonstrate strong interest in advanced data collection technologies, particularly mobile/GSM data, but cite financial constraints as the primary implementation barrier. Multiple responses indicate systemic challenges, including insufficient funding (for data collection in general), limited personnel capacity, and lack of technical expertise. These constraints drive reliance on traditional methods despite recognition of their limitations.

However, the organisations struggle to balance comprehensive quantitative data collection with detailed qualitative insights, often defaulting to methods that provide depth rather than breadth due to resource limitations.

The research question (3) barriers encountered is partially answered already in the content analysis as the "secondary" product, and it confirms the output from the workshops. However, the qualitative analysis is needed to see how important the barriers are. The results are presented in Figure 2. Barriers in data collection.

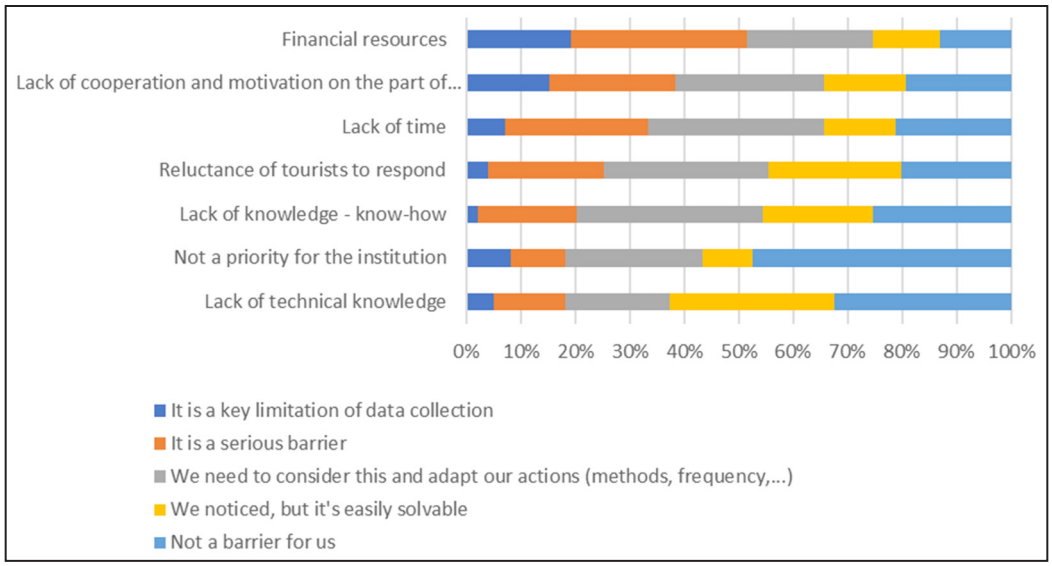

Figure 2. Barriers in data collection
Source: Own calculations

Figure 2 presents the key barriers in data collection. The most important obstacle is the lack of financial resources (51.5%). Surprisingly, the second reason is the lack of cooperation and motivation on the side of monuments and businesses. They don´t see any added value in data collection and sharing. Therefore, they are not motivated to do so. Lack of time is the third most important barrier.

The fourth question (4) about data analysis employed brought a significant gap between the data potential and real usage. The basic operations are employed by 53% and 45% of respondents (organising data into tables and graphs (using percentages, and using basic descriptive statistics (e.g., average), respectively). More complex analysis like performing statistical testing (e.g., examining correlations) (15%), time series analysis (21%), complex quantitative methods (e.g., cluster analysis, factor analysis, regression analysis) (5%), and selected qualitative methods based on text evaluation (e.g., sentiment analysis) (14%), are far behind leaving the most important insights into the data hidden. 11% of respondents only collect and store the data without any further usage or analysis. It is alarming that only 21% of respondents use time series, as the development is an important indicator of success and effectiveness.

And lastly, the fifth question will be answered regarding the usage of the data (5). The most important usage of data is seen in identifying needed improvements, developing partnerships, monitoring and influencing changes, and evaluating the results of actions.

Table 3. How would the participants like to use the data - for what purposes (number of mentions)

Usage	Mentions	%	Usage	Mentions	%
Identify needed improvements	82	82,8	Funding applications	46	46,5
Develop partnerships	71	71,7	To assure stakeholders that decisions are correct	44	44,4
Maintain and increase competitiveness	66	66,7	Respond to public concerns and criticism	42	42,4
Track and influence changes	64	64,6	Investment support	36	36,4
Evaluate the results of actions	59	59,6	It is easier to disprove some distorted information or interpretations	33	33,3
Arguments to partners, citizens	52	52,5	To start a dialogue	25	25,3
Finding partners for projects	49	49,5	Organization of seminars	20	20,2

Source: Own research

6. CONCLUSION

Based on research, we can conclude that the data culture in organisations in smaller cultural destinations is underdeveloped. This study advances data culture theory by demonstrating its context-dependent nature in resource-constrained environments. The "aspiration-reality gap" concept extends existing frameworks by showing how an organisation's intentions may not align with capabilities, particularly in public tourism organisations. There are many barriers in data collection, and the most important is funding (financial challenges), which is in accordance with Borowiecki et al. (2024). There is a significant gap between the potential data and the real analysis applied (Baggio & Klobas, 2017). As mentioned by Hussinki et al. (2025), developing the data culture is a task for the whole organisation and is a long-term challenge. The respondents understand the potential of the data and see a wide range of usage.

To summarize, considering the three dimensions, (1) technical capabilities (infrastructure, tools, skills), (2) organizational practices (data governance, processes, roles), and (3) cultural attributes (data literacy, trust in data, data-driven mindset) (Kiron et al., 2014), we can state that the actual data culture is on low level, especially in the first two dimensions. Technical capabilities are mainly limited due to financial resources; organisational practices are low due to personnel capacities. On the other hand, the respondents do not worry that they would not understand the data; and their intention towards a data-driven mindset is very high. The barriers "lack of know-how", "lack of technical knowledge" and "data not being a priority" are the least limiting obstacles. The cultural dimension is therefore considered as potentially being at a high level. However, this constellation creates the "aspirational data culture" – where organisations recognise data value but lack implementation capacity.

The difference in data culture reflects incomplete decentralisation, where local governments have responsibility for tourism but lack data capacities for decision-making. This suggests the need for multi-level governance solutions combining local autonomy with regional/national data support (Oates, 1999). First, the establishment of standardised methodological frameworks is essential to enhance data comparability across organisations while preserving necessary flexibility for localised adaptations. This entails defining minimum data standards and compatible protocols that can be widely adopted without impeding contextual relevance. The gap between ideal bespoke solutions and limited capacities and funding underscores the need for collaborative purchasing models. By pooling resources regionally or nationally, smaller organisations can access costly data

such as mobile operator or payment card information. Sustainable technology adoption also demands targeted technical and financial support – managers should fund training programs and equipment subsidies to shift from manual to digital data collection. Finally, centralised data-sharing platforms can reduce effort duplication and enable benchmarking through aggregated analyses, fostering collaboration and improving the effectiveness of tourism monitoring systems.

Comprehensive policy recommendations based on the results:
- Regional data cooperation mechanisms to achieve economies of scale,
- Conditional grants linking data capabilities to tourism funding,
- Public-private partnerships for data infrastructure sharing,
- Capacity building programs addressing the institutional coordination barrier.

The research suffers from several limitations. Considering the number of small cultural destinations in the countries, the number of respondents is relatively high; however, to be able to generalise the results, we might need a higher number. The sample's representativeness is still limited. Also, geographically limited data collection does not enable us to project the results to the whole of Europe. The respondents were chosen based on their willingness to answer; therefore, the answers might be biased by their interest in data collection. The institutional heterogeneity across participating countries, their data collection systems and current data accessibility may affect both data comparability and interpretative robustness.

The paper is of significance for both academic research and applied destination governance, particularly in the context of digital transformation and evidence-based tourism management. The concept of "aspiration-reality gap" is identified and explained in principle. Future research might focus on clearer conceptual boundaries, a clearer positioning within the existing literature, and potential framing as a mid-range theoretical construct in tourism data culture research.

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