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CHALLENGES AND METHODS OF MEASURING TOURIST FLOW IN REGIONS

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Purpose: The aim of this paper is to identify the barriers and challenges associated with measuring tourist flow at a regional level, and to explore data collection methods used by Regional Tourist Organizations in Poland.
Design/methodology/approach: This article employs a qualitative research methodology. Fifteen individual in-depth interviews (IDIs) were conducted with representatives from Regional Tourist Organizations.
Findings: The research findings indicate that Regional Tourist Organizations recognize difficulties in accurately collecting data on tourist flow, and in most cases, utilize at least several different sources of data on tourists and visitors. The paper identifies key barriers and challenges such as the lack of uniform measurement standards and budget constraints, which impact the quality and availability of tourist flow data.
Research limitations/implications: The research findings presented include an analysis of qualitative data derived from interviews with representatives of Regional Tourist Organizations in Poland. However, the results obtained may serve as a foundation for further, more in-depth research in this area among other stakeholder groups.
Practical implications: The findings of the study can contribute to a better understanding of the issues associated with accurate measurement of tourist flow in regions.
Originality/value: The article offers a fresh perspective on the challenges associated with measuring tourist flow in regional areas. The study provides insights into the effectiveness and limitations of current measurement practices, such as difficulties in obtaining accurate data and privacy issues, as well as identifying the most significant needs related to data collection on tourist flow, which can contribute to improved tourism management in regions.
Keywords: tourist flow, measurement of tourist flow, Regional Tourist Organization.
Category of the paper: research paper.

1. Introduction

Tourism plays a pivotal role in both national and regional economies, contributing to increased employment, investment, and improved quality of life for local communities. However, the growing mobility of tourists presents challenges related to managing tourist flows, environmental protection, and the preservation of cultural heritage. Effective management requires up-to-date and reliable data on tourist movements, which are essential for strategic planning and monitoring the effectiveness of initiatives. Traditional data collection methods, such as accommodation statistics or surveys, are insufficient, particularly in the context of day tourism and informal accommodations. The lack of standardized measurement practices complicates data comparison and the development of insights. Regional Tourism Organizations require credible information to fulfill their statutory responsibilities. Therefore, it is necessary to discuss the implementation of more efficient methods for measuring tourist flows and the standardization of practices, which would enable Regional Tourism Organizations to manage tourism more effectively and address the challenges of the contemporary market.

The aim of this article is to identify the barriers and challenges associated with measuring tourist flows at the regional level and to examine the methods used by Regional Tourism Organizations to collect data on tourist movements. The authors base their analysis on empirical material obtained through 15 in-depth interviews. The findings provide insights into best practices in measurement and serve as the basis for recommendations to improve data collection processes.

2. Literature review

Measuring tourist flow constitutes a fundamental component of planning and managing tourism, enabling the understanding of tourists' behaviors, preferences, and their impact on visited areas (Freuler, Hunziker, 2007; Zubiaga et al., 2019; Vašaničová, 2024). Additionally, the measurement and real-time prediction of tourist flow can be utilized in crisis situations, supporting the activation of emergency plans and preventing accidents related to safety (Lu et al., 2020). It is crucial from the perspective of contemporary tourism economy requirements to develop a method for continuous monitoring of tourist flow (Borkowski, Seweryn, 2010). However, monitoring and analyzing tourist flow encounter numerous difficulties, both technical and methodological, partly due to the fact that they cover a wide range of research topics (Gu1 et al., 2023), which often makes them estimative and conducted using varying methodologies (Schägner et al., 2017). Technical difficulties may also arise from

the imperfections of devices and technologies used to measure tourist flow (Rogowski, Piotrowski, 2022), yet these devices are employed for monitoring and managing tourist flow, for example, in national parks where such traffic should be regulated due to its environmental impact (Maršálek, Houdek, Pecharová, 2013).

According to Borkowski (2018), data collection poses numerous challenges, including the diversity of tourism types and forms, their dispersed nature, irregular occurrence, and high variability. The diversity of source materials, inconsistent in nature, impedes both detailed analyses and precise, comprehensive representation of the phenomenon across the studied area. This is particularly evident in monitoring tourist flow in national parks, which employ various methods and do not maintain a uniform frequency of studies (Spychała, Graja-Zwolińska, 2014). This hinders their comparison, also because they typically focus only on selected, most popular spots within their territories (Zbucki, 2022). This also applies to large tourist destinations managed by regional tourism organizations, where studies are conducted with varying frequency, using different methodologies and gathering diverse information about tourists and day visitors (see: Szmatuła et al., 2016; Borkowski, 2020; Ziółkowski, 2020; Szpara, Gierczak-Korzeniowska, Stopa, 2023).

Studying tourist flow is a unique methodological challenge (Szpara, Gierczak-Korzeniowska, Stopa, 2023). Official government statistics only cover tourists, i.e., those who use accommodation facilities (additionally, only those required to report to the Central Statistical Office of Poland). At the same time, the increasing number of day visits and non-rental of lodging places (visits without overnight stay) requires adapting the tools for studying tourist flow to changes in tourists' behaviors (Daas, Puts, Buelens, 2015). Various attempts are made to "estimate" the traffic comprising day visitors (based on counters at national park gates, scale of ticket sales, contact at tourist information points, observations in dining establishments or within tourist attractions (Kruczek 2016; Rogowski, 2017).

One of the key aspects of conducting studies on tourist flow is information technology, which also plays a leading role in the development of the tourism industry (Buhalis, Law, 2008). Interactions between tourists and technological solutions, and consequently, increased use of mobile phones during travel, not only affect the management of the tourist region (Werthner, Klein, 1999; Benckendorff, Sheldon, Fesenmaier, 2014; Xiang, 2018) but are also used to study tourist flow (Alejziak, 2009; Piechota, 2014; Qin et al., 2019).

New technologies are also used to monitor tourist flow and manage it appropriately in the context of increasingly popular sustainable tourism (Novas et al., 2017; Bertocchi, Van der Borg, Camatti, 2021). Zubiaga et al. (2019) additionally point out that new technologies (Internet of Things, Big Data, and geographic information systems) networked together provide much better quality data on tourist flow, thus enabling intelligent management of tourist flow, especially in places that require a sustainable approach.

In 2018, studies showed that Americans spent 3.6 hours a day on mobile devices, representing a twelvefold increase over 10 years. In 2020, the number of hours spent using mobile internet rose to about 4 hours a day, and the time spent in mobile apps increased by 88% (Safaa, Eman, 2022). Mobile phones have become the preferred devices for accessing the internet (Wang, Park, Fesenmaier, 2012), also playing a crucial role in providing information about tourists.

The accuracy of tourist flow measurements is also affected by technological limitations, such as lack of mobile network access in remote locations or concerns about the privacy of tourists. However, traditional methods, such as surveys and observations, although useful, can be time-consuming and do not always yield representative results. In response to these challenges, further advanced digital tools are being developed, such as data analysis from payment cards, mobile network logins, and the use of GPS technology. The application of a combined approach of Big Data and small data can solve the problem of methodological imbalance and generate mutually reinforcing insights at multiple levels, thereby complementing the data analysis process on tourist flow (Xu, Nash, Whitmarsh, 2019). So-called smart tourism, which requires collecting and analyzing data from various sources, is an emerging research trend (Buhalis, 2020), responding to the rapidly changing needs of travelers and accelerating the digitization of travel (Ilhan, 2021).

The difficulties and limitations in conducting studies on tourist flow in no way diminish the necessity of their conduct (Szpara, Gierczak-Korzeniowska, Stopa, 2022). Acquiring comprehensive data on tourist flow is very important. They allow for the development of strategic documents and planning actions, marketing and promotional activities in the development of tourism, managing tourist directions, tailored to local needs and conditions (Więckowski, Saarinen, 2019). They become the basis for spatiotemporal simulations: intensity of tourist flow, potential directions of tourist penetration spread, or serving to prevent conflicts between tourists and residents. Moreover, they enable the management of tourist flow and the appropriate preparation of tourism infrastructure and offerings in line with visitors' expectations (Zbucki, 2023).

3. Methodology

The authors collected empirical data by conducting individual in-depth interviews (IDI) with representatives from Regional Tourism Organizations in Poland. For the purposes of the article, 15 interviews were carried out, each lasting between 45 to 75 minutes, with a total of 19 participants involved. The research process commenced in August and concluded in September 2024. The primary research tool was an interview guide, which included open-ended questions that allowed participants to freely and uninhibitedly express their opinions.

In qualitative research, sampling is understood as a method for collecting carefully selected "cases" that represent a set of empirical examples, facilitating thorough analysis of the phenomenon under study (intentional sampling) (Flick, 2010). Qualitative studies focus on in-depth analysis of a given phenomenon (Rószkiewicz et al., 2021) and allow for creative and flexible approaches. Methodologists note that these studies also require sensitivity to the socio-organizational contexts of participants (Glinka, Czakon, 2021).

The in-depth interview is a qualitative research technique that involves conducting individual conversations with a limited number of respondents to explore their perspectives on a specific topic. The authors opted for individual in-depth interviews (IDI) for several reasons: (1) they are useful when the problem requires detailed knowledge from participants; (2) they are applicable in studies involving hard-to-reach groups; (3) they not only assess but also help understand the formation process of a phenomenon and facilitate the free, open expression of opinions; (4) they foster a conducive atmosphere for intimate discussions (Bryman, Bell, 2007; McDaniel, Gates, 2010; Glinka, Czakon, 2021). The primary advantage of in-depth interviews is that they provide highly detailed information. However, the results are not representative and cannot form the basis for statistical inference.

Before collecting empirical data, the authors defined the exploratory goals and the research problem, and then formulated general interview questions. The research question was articulated as follows: What are the data collection needs of Regional Tourism Organizations regarding the volume of tourist flow in regions, and how do they assess the usefulness of the information gathered? The objective of the study was to gather opinions from representatives of Regional Tourism Organizations about the tools available for measuring tourist flow.

The empirical material obtained allowed the authors to address the following research questions:

- RQ1. What are the data collection needs of Regional Tourism Organizations regarding tourist flow?
- RQ2. How do Regional Tourism Organizations currently collect data on tourist flow?
- RQ3. What barriers hinder Regional Tourism Organizations from measuring tourist flow?

The interviews were recorded, transcribed, and then analyzed considering qualitative aspects. The analysis involved organizing the collected data and interpreting it. The research process followed these steps: data sorting, data reduction and coding, final interpretative analysis, and conclusion formulation (Gibbs, 2018). During data analysis, open coding was applied, which meant there was no preconceived conceptualization. The aim was to define key issues, not to impose interpretations of events based on previously formulated theories. This approach allowed for a deeper understanding of the needs and barriers faced by Regional Tourism Organizations. Thus, it was possible not only to identify difficulties and challenges in measuring tourist flow but also to propose specific solutions that could enhance the effectiveness of data collection and analysis in this area. The findings may also inspire future research in the field of data management concerning regional tourist flow.

All Regional Tourism Organizations operating in Poland were invited to participate in the study. Ultimately, 15 out of 16 Regional Tourism Organizations participated, including:

1. Lower Silesian Tourism Organization.
2. Kuyavian-Pomeranian Regional Tourism Organization.
3. Lublin Regional Tourism Organization.
4. Lodz Regional Tourism Organization.
5. Lesser Poland Tourism Organization.
6. Masovian Regional Tourism Organization.
7. Opole Regional Tourism Organization.
8. Subcarpathian Regional Tourism Organization.
9. Podlasie Regional Tourism Organization.
10. Pomeranian Regional Tourism Organization.
11. Silesian Tourism Organization.
12. Holy Cross Regional Tourism Organization.
13. Warmian-Masurian Regional Tourism Organization.
14. Greater Poland Tourism Organization.
15. West Pomeranian Regional Tourism Organization.

Participant characteristics were presented in Table 1.

Table 1.
Research Participants' Profile

IDI number	Characteristics of interview participants		
	IDI Participant Position	**Gender**	**Research designation**
1.	Director of the Office	M	E1
2.	Specialist in Organizational and Formal Affairs	F	E2
3.	Managing Director	M	E3
4.	Director of the Board Office	F	E4
5.	Director of the Office	M	E5
6.	Social Media Specialist	F	E6*
7.	Senior Specialist for Promotion and PR	M	E7*
8.	Director of the Office	F	E8
9.	Office Coordinator	M	E9
10.	Director of the Office	F	E10
11.	Deputy Director of the Office	F	E11
12.	Director of the Office	F	E12
13.	Office Coordinator	F	E13*
14.	Senior Specialist in the Tourism Division of the Department of Tourism, Sports, and Foreign Affairs, Marshal's Office	F	E14*
15.	Senior Specialist in the Tourism Division of the Department of Tourism, Sports, and Foreign Affairs, Marshal's Office	F	E15*
16.	Marketing Specialist	M	E16
17.	Director of the Board Office	M	E17
18.	Director of the Office	M	E18*
19.	Director of the Office	F	E19*

*the interview was conducted with the participation of two or three people at the same time.

Source: own elaboration.

The interviews were conducted with representatives of Regional Tourism Organisations who in most cases held management positions (directors or deputy directors) in these units or were in charge of marketing area, including promotion and social media. In each organisation, the director decided who would participate in the interview. These were employees with the most experience and knowledge in using data on tourist traffic in the region.

4. Results

Based on individual in-depth interviews, key areas and methods of collecting data on tourist flow in various regions were identified. The diversity of approaches and technologies used by Regional Tourism Organizations reveals a varied level of methodological advancement across regions. During the interviews, participants expressed their views on the needs and methods of gathering data on tourist flow and discussed the challenges and barriers that complicate this process.

Initially, interview participants were asked about their data needs regarding tourist flow, aiming to address the first research question **(RQ1).** Responses highlighted a clear demand for both quantitative and qualitative data about tourists. All interviewees emphasized the importance of regularly collecting this information, which is supported by the following statements: "without reliable data on the number of tourists and their behaviors, it is difficult to consider promoting and developing tourism in the region" (E19), "data on tourist preferences are essential for creating offers that meet their expectations" (E2), and "they are needed because they provide us with feedback, allowing us to identify areas that may require more promotion (…), and also facilitate future actions" (E16).

During discussions, representatives of Regional Tourism Organizations emphasized the need for more detailed, current, and comprehensive data on tourist flow in the region. According to research findings, the data needs of Regional Tourism Organizations were classified into five key categories:

1) Current/Operational – includes up-to-date data on the number of tourists arriving in the region, including their seasonality and intensity in different locations. Monitoring tourist flow dynamics helps analyze trends and supports adjusting actions to changing demand.
2) Developmental/Strategic – long-term planning for the development of tourism in the region requires comprehensive data on trends in tourist flow. Regional Tourism Organizations need analyses that include forecasts and changing traveler preferences to minimize the negative impacts of mass tourism and support sustainable development of the region.

3) Marketing, in terms of:
   - Tourist segmentation – the need to acquire demographic and behavioral data, such as age, origin, preferences, and spending patterns of tourists, which are crucial for precisely targeting promotional campaigns and developing offers that meet the specific needs of different tourist groups;
   - Assessing the effectiveness of marketing actions – the need to obtain data that enables the evaluation of marketing activities, which allows for the optimization of marketing strategies and efficient resource allocation.
4) Reporting – Regional Tourism Organizations are required to report the results of their activities to local authorities and stakeholders. Reliable data on tourist flow forms the basis for developing credible reports that can justify future plans, investments, and necessary financial support.
5) Cooperation and collaboration – needs reflecting the tourism industry's aim for integrated cooperation in data collection, which would help achieve common goals and enhance benefits for all members in individual regions.

In seeking answers to the second research question **(RQ2),** interview participants were asked about their previous experiences and methods of collecting data on tourist flow in the region. During the interviews, a few representatives of Regional Tourism Organizations indicated that they do not feel a shortage of data on tourist flow and consider the methods used so far for gathering information as satisfactory (E2, E10, E18, E19).

Identified methods of collecting data on tourist flow utilized by Regional Tourism Organizations for this article were classified into three groups.

The first group includes conducting primary research on tourist flow. Regional Tourism Organizations conducting detailed surveys using questionnaires in the field, for instance using tablets with an application that directly transmits results to the database of the Regional Tourism Organization (E2), represent a few cases in the country. Surveys cover major tourist centers but also (though much less frequently) smaller localities in the region, and the data obtained allow for the analysis of tourist routes and preferences of visitors. However, interview participants emphasized the lack of systematic collection of this data (E3, E5, E11). In the context of understanding tourists' needs and expectations, a representative of one of the Regional Tourism Organizations pointed out: "A few years ago we collected data (...), what tourists expect, what they need in different places throughout the region" (E4). Few entities analyzed conduct their own empirical research annually (E2) or every two years (E8).

The analysis of the results of the conducted studies indicates that the situation in other regions is quite different. Despite recognizing the need to have this type of data, Regional Tourism Organizations do not conduct systematic primary research on tourist flow, as evidenced by the following statements from participants: "we as a Regional Tourism Organization have never conducted our research (...), as for such regular studies on tourist flow, they have never taken place. These were things done pointwise in selected years" (E3),

"we do not conduct research in a formalized form" (E13) or another statement "we have a very big problem with this for many years (...). We should actually conduct research on tourist flow every year. Unfortunately, there is a lack of understanding in the decision-making bodies managing the province, hence there is a lack of funds" (E5). Despite highlighting in interviews that qualitative data about tourists constitute a valuable source of information for most Regional Tourism Organizations, there were also statements such as: "we do not collect qualitative data" (E13) or "in recent times, there have been no such regular studies" (E3).

In studies on sources of information used by Regional Tourism Organizations, particular attention during interviews was paid to statistical data and various information collected by local partners and tourist information points, classified in the article as desk research sources representing the second group of data on tourist flow. Data from the Central Statistical Office (Poland) are valued by interview participants for their systematic nature and repeatable methodology, which allows for identifying trends in tourist flow.

As one respondent noted, "Central Statistical Office data have the advantage of being collected systematically, based on a repeatable methodology of studies over many years, which allows building a trend line and searching for repeatable phenomena" (E6). However, the limitations of this data, such as the lack of information about day tourists or not including lodging facilities with fewer than 10 places, are significant problems in comprehensive analysis of tourist flow (E6, E8). As one participant emphasized: "These data are incomplete, because they depend on whether a given tourist facility fully transmits information. Moreover, Central Statistical Office data do not include day tourists (...). Data from tourist facilities are also incomplete, because not every tourist uses ticketed attractions, which can also lead to errors" (E6). On the other hand, there was also the following comment: "As far as trends are concerned – yes, these data are sufficient" (E8).

Regional Tourism Organizations also use data from local sources, such as statistics conducted by the administration of tourist attractions, tourist information points, or partner organizations. These provide detailed data on the number of visitors and their origins. This is evidenced by the following statement: "We have information from tourist information points, which provide us with valuable data. The number of tourists who visit these points often exceeds certain thresholds, which gives us important information (...), indicating the directions from which tourists come, which is very important for us" (E9). However, this process is not sufficiently satisfactory from the perspective of interview participants, as the lack of qualitative data limits the ability to fully understand the profile of tourists, their motivations, or ways of planning trips (E5, E8). As interview participants emphasize, it is important to regularly monitor tourists' opinions and collect them preferably in many different places such as tourist information points or cultural attractions and others (E1, E2, E3, E4, E9, E13, E14, E18, E19).

This is evidenced by the statement of one participant: "We collect information from our members, asking them to provide such data. These are both tourist attractions, so we ask for the number of guests who bought tickets or visited a given place (...). It is a far from satisfactory

method (...), but unfortunately, that's what it looks like. Thus, we do not have detailed information about who comes to us, why, from where they obtained such information and (...) from where they come to us" (E5). A similar position regarding data collection from ticketed attractions was presented by another participant: "For over 10 years we have been researching attendance at tourist attractions (...), it is done through the declaration of the number of tickets sold" (E17). For example, in the northern coastal region, data from partners, such as transport operators, the airport, and the highway manager, are also used, allowing for monitoring the flow of visitors at key entry points to the region (E3). Additionally, Regional Tourism Organizations use statistics from websites and social media to estimate tourist flow (E8, E12, E16).

Moreover, Regional Tourism Organizations use industry studies, provincial city studies, or publicly available reports, as confirmed by the following statements from participants: "We also read reports published by the Polish Tourism Agency and other studies commissioned by it, which allows us to obtain a broader, albeit general, knowledge" (E6) or "Since 2007, we have been using the same research method – the annual Omnibus Study" (E10).

Increasingly, modern technologies such as bicycle and multimodal traffic counters are used in the analysis of tourist flow, which allows for precise monitoring of the number of visitors and analyzing hourly and daily trends. As emphasized in one of the interviews: "the method we have been using for several years are bicycle counters based on induction loops (...), we also tested a multimodal counter that counts cyclists, pedestrians, and cars" (E13).

Data collected in this way are systematically analyzed by Regional Tourism Organizations to develop conclusions about the seasonality and congestion of tourist infrastructure in the region (E3). However, from a methodological perspective, relying on information obtained exclusively from lodging facilities, without the obligation of reporting, leads to significant distortions in the picture of reality. As a result, studies based on such incomplete data do not reflect the actual scale of tourist flow, which limits their usefulness in planning and managing tourism at the regional and national levels.

Experts in their statements emphasized the growing importance of data derived from mobile phone traffic analysis, classified in this article as the third group of data on tourist flow. Regional Tourism Organizations that have purchased data from tracking mobile devices are still few cases in the country (E2, E4, E17, E18, E19). Experts recognize the potential of Big Data analysis in the context of improving the quality of studies on tourist flow in regions and planning promotional activities (E12). As one respondent noted: "For the past three years, we have also been conducting research using the Big Data method (...). Thanks to this method, we receive data on the number of tourists, where they came from, and how long they stayed, but we cannot examine other parameters, such as how much money they left" (E10). This approach provides valuable information on the dynamics of tourist flow, although it still has its limitations.

Another study participant pointed to the role of Big Data in tourism research, noting that: "having Central Statistical Office data and Big Data, we use them primarily to get a picture of what tourist flow in the region looks like" (E18). Moreover, as emphasized in another statement, data based on Big Data technology are more precise and reflect the real picture of the tourism market, which is changing due to the development of new forms of accommodation: "Big Data is to some extent more reliable. Central Statistical Office surveys lodging facilities with more than 10 people, which with a market that largely consists of apartments, some sales systems through applications, accommodations and so on, provides a more true picture resulting from applications, studies. This helps us understand where most people are" (E18).

Such technologies allow for even more accurate monitoring of tourist flow in regions, which can provide valuable information in the context of developing tourism based on the actual needs and preferences of visitors. In the context of these statements, data based on mobile phone and Big Data are gaining importance, offering not only a more precise picture of tourist flow but also indicating directions for future research and analysis. Sources of data acquisition about tourist flow indicated by interview participants are presented in Figure 1.

The size of the font used reflects the frequency of mentions during the interviews.

Figure 1. Sources of information on tourist flow used by Regional Tourism Organizations.

Source: Own development using Word Art.

It should be emphasized that all interview participants employ a multi-faceted approach that integrates various (and regionally available) sources of data on tourist flow. This is evidenced by statements such as, "we use three methods from which we triangulate data" (E2), and "we need to compile all these sources and compare them. Only then can we extract the best and most reliable answers" (E4). According to the interview participants, diversity is necessary because while Big Data, commissioned from external companies, assists in analyzing the number of tourists, primary research allows for a better understanding of tourists' opinions about the region (E2, E18, E19). However, most experts pointed out the need to expand the

scope of data collected on tourist flow in the future compared to current efforts. This is indicated by the statement: "we always lack qualitative information. I would like to have more data, especially in the context of using Big Data" (E8).

Regional Tourism Organizations most commonly utilize a combination of data obtained from field surveys and information provided by local business partners (E1, E2, E4, E9). The triangulation of results and obtaining a fuller picture of tourist flow was emphasized in the following statement: "However, I imagine that ideal research for regions, conducted year to year, should be a mix of data – from credit card users, through mobile phone data, to information concerning airports, ferry terminals, or entry to attractions. Additionally, data on why tourists appear in the region and what happens during their stay are useful" (E3). This is also confirmed by another expert: "I think we need to compile all these sources and compare them. Only then can we extract the best and most reliable answers to the questions that concern us" (E4).

In seeking answers to the third research question **(RQ3)**, interview participants were asked about the barriers that hinder the measurement of tourist flow in their region. The obtained responses are presented in Figure 2.

The size of the font used reflects the frequency of mentions during the interviews.

Figure 2. Barriers to measuring tourist flow in regions identified during interviews.

Source: Own development using Word Art.

Based on the research results, four main barriers related to measuring tourist flow were identified:

1) Financial barrier – associated with the high costs of conducting research and acquiring data.
2) Organizational barrier – linked to the lack of appropriate structures, systems, or coordination of research activities within Regional Tourism Organizations.
3) Personnel barrier – related to the attitudes of institutional employees, including reluctance to share information, fears, and resistance to cooperation in terms of collecting and sharing data.
4) Social barrier – associated with tourists' attitudes, referring to their reluctance to participate in research due to concerns about privacy, time, or lack of awareness of the purpose of the studies.

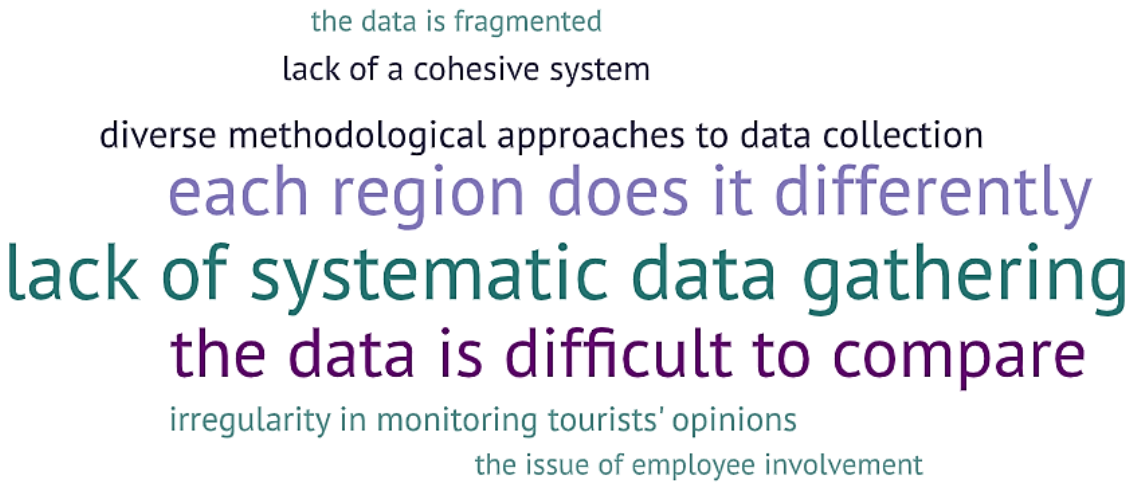
The most significant barrier, as indicated by respondents during the interviews, is the financial barrier. It results from the high costs associated with conducting their own research or outsourcing it, as well as purchasing data derived from mobile telephony. This is confirmed by the following opinions: "We continuously lack comprehensive statistics that could cover various areas. Wanting to conduct qualitative research, we have to specially order it, which is expensive" (E13, E14) and "We are one of the smallest Regional Tourism Organizations in terms of budget in Poland, which also prevents us from taking a systematic approach to research. We do not have the funds for it, and on the other hand, the world has moved forward so much that returning to paper surveys is now completely pointless, because it is an expensive study" (E11). It is worth emphasizing that all participants confirmed that acquiring data on tourist flow is highly costly.

The next significant barrier turned out to be the organizational barrier, related to the lack of proper structures and human resources to conduct systematic research. Respondents pointed to difficulties in organizing research activities, especially in smaller units that do not have sufficient funds or an adequate number of employees to conduct large-scale studies.

Additionally, interview participants emphasized that the negative attitude of local partners towards sharing data and a general reluctance to share information constitute a serious barrier identified as personnel-related. This issue affects representatives of various institutions and organizations. Resistance from the managers of institutions and employees of cooperating organizations, who are not always open to collaboration in terms of data exchange, was also highlighted. Moreover, participants pointed out difficulties arising from a lack of trust in the quality of data provided by other entities, which exacerbates concerns about the reliability and accuracy of the information collected in this way.

A social barrier, difficult to overcome, though less frequently mentioned during the interviews, was also the reluctance of tourists themselves to participate in research. This is particularly evident when collecting qualitative data, which requires the engagement of tourists and is time-consuming.

During the interviews, several difficulties related to the data collection process were pointed out (Figure 3), which were linked to the previously identified barriers. Interview participants highlighted the lack of a coherent and coordinated approach to data collection within the activities undertaken by Regional Tourism Organizations. The fragmentary nature of the collected information was also emphasized, which is often difficult to compare due to the diversity of research methods used in different regions. The absence of a unified monitoring system and irregularity in analyzing tourists' opinions posed additional challenges. Varied methodological approaches limit the possibilities for analysis and complicate the drawing of conclusions and identification of trends. Moreover, the insufficient engagement of employees responsible for conducting research proved problematic, which in some cases hindered the continuity and reliability of research processes. There was an indication of the need to improve work organization and increase staff motivation to ensure, for example, the systematicity and precision of conducted research.



The size of the font used reflects the frequency of mentions during the interviews.

Figure 3. Difficulties in measuring tourist flow in regions.

Source: Own development using Word Art.

In various provinces, one can observe different approaches to researching tourist flow. Only a few Regional Tourism Organizations regularly conduct survey studies, which allow for understanding the opinions and experiences of tourists. Data on tourist flow, although fragmentary, are also collected at tourist information points and in popular tourist spots, enabling the adaptation of reports to the specifics of local needs and monitoring changes in tourist flow throughout the year. Another group consists of data derived from the use of advanced digital tools, including Big Data and analyses based on mobile telephony. From the perspective of representatives of Regional Tourism Organizations, to obtain as complete a picture as possible of tourist flow in a region, it is essential to combine various sources of information, with special emphasis on Big Data, industry reports, and their own research, which are considered by IDI participants as the most reliable sources.

5. Discussion

The interviews conducted enabled the identification of barriers and challenges associated with measuring tourist flow by Regional Tourist Organizations, as well as an understanding of their needs and practices regarding data collection. The results confirmed a need for the accumulation of reliable and accurate tourism flow data. This general need, articulated in interviews, was specified in detailed justifications, which were categorized as follows (RQ1): operational/current, developmental/strategic, marketing, reporting, and related to the implementation of activities focused on cooperation with other tourism market entities.

The findings from the interviews provided valuable knowledge about the practice of collecting data on tourist flow (RQ2). Regional Tourist Organizations fulfill their statutory tasks in this area by selecting one, two, or three of the following options: conducting primary research on tourist flow, analyzing secondary data on tourist flow, and analyzing data from mobile phone traffic analysis. These methods are considered the most traditional, aligning with methods indicated by other researchers. Wolf, Hagenloh, and Croft (2012) evaluated four techniques for monitoring visitors to a site, concluding that GPS tracking of tourists is the most reliable and provides the most detailed data. However, they considered conducting primary surveys among tourists as a supplementary method, noting that surveyed tourists do not always accurately recall all visited sites and vary in their ability to describe them. Real-time location information from mobile phones is used to monitor tourist flows and analyze behavior at specific tourist attractions (Qin et al., 2019), with the significance and utility of these data also highlighted by interview participants. In some cases, methods used for analyzing and predicting precise tourist flow in popular tourist sites in real time are based on more complex neural network models that utilize data from multiple sources (Lu et al., 2020); however, these are methods not yet employed by the Regional Tourist Organizations analyzed in the article.

Own research conducted for the article allowed for the creation of an extensive list of categories of barriers that, according to the declarations of representatives of Regional Tourist Organizations, hinder the measurement of tourist flow (RQ3). Among these constraints, the following barriers were identified: financial, organizational, personal, and social. Barriers related to measuring tourist flow were also studied by Gul et al. (2023). According to their results, the main limitations to reliable measurement of tourist flow include technical and methodological barriers. Additional challenges are associated with inaccurate measurement of tourist flow by the devices and technologies used (Rogowski, Piotrowski, 2022), with this aspect also highlighted during the interviews, particularly in the context of collecting such information only in selected locations. Entities involved in measuring tourist flow often conduct superficial research, focusing, for example, on counting the number of tourists but not delving into the motives for their arrival or analyzing behavior at the site (Buckley et al., 2008). The results obtained in the interviews thus indicate a greater number of barriers encountered by Regional Tourist Organizations in Poland than those discussed in the literature, allowing for a more comprehensive view of the issues related to measuring tourist flow.

6. Conclusion

The conducted research facilitates an understanding of the functioning of the tourist flow measurement system in Poland. An analysis of in-depth interviews with representatives of Regional Tourist Organizations has identified key areas requiring improvement. The study

highlighted a fundamental need for access to current quantitative and qualitative data on tourist flow, with particular emphasis on the need to develop a uniform methodology for data collection at the national level, coordinated by the Polish Tourist Organization. Regional Tourist Organizations currently employ varied data collection methods, integrating traditional approaches with modern ICT technologies. However, the research indicates that the level of methodological advancement significantly varies between regions. Identified barriers to measuring tourist flow focus on four main areas: financial (insufficient funds), organizational (limited staff and time resources), personal (negative attitudes of institutional employees, including reluctance to share information), and social (tourists' reluctance to participate in studies). A solution to overcome these barriers may be found in the proposal by the authors for an integrated system of tourist flow monitoring through cooperation between Regional Tourist Organizations, local authorities, business, and the academic community, and the implementation of modern technologies, especially in the area of Big Data and mobile analytics aimed at developing a dedicated mobile application to streamline the measurement of tourist flow.

The research results also provide a basis for formulating recommendations for tourism policy at the regional and national levels. Further actions by the research team will focus on developing models of intersectoral cooperation and research methodologies that take into account the specifics of the Polish tourism market in the context of ongoing technological and social changes.

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