BABEȘ-BOLYAI UNIVERSITY, CLUJ-NAPOCA

FACULTY OF GEOGRAPHY

DOCTORAL SCHOOL OF GEOGRAPHY

DOCTORAL THESIS

MOUNTAIN CYCLING TOURISM AS AN INSTRUMENT FOR THE VALORIZATION OF RURAL-MOUNTAIN TERRITORIAL HERITAGE.

CASE STUDY: APUSENI NATURAL PARK

- Summary of the doctoral thesis -

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CONTENTS

1. Introduction

1.1. Why cycling tourism?

Cycling tourism in general, and mountain cycling tourism in particular, offers a wide range of opportunities, from a magical immersion in the local community (Bull, 2010), and rides along unpaved trails shared with friends or family amid the unique spectacle of nature (Ritchie , Tkaczynski , & Faulks, 2010), to the benefits afforded by new technologies incorporated into electric bicycles (Rauter, Supej, & Vodicar, 2023). Mountain cycling tourism enhances social inclusion within rural communities (Leichenko & Taylor, 2024), and, through the physical activity generated by cycling, contributes to the physical and mental health of practitioners, reducing health risks and premature deaths associated with sedentary lifestyles (Oja, și alții, 2011). Under these circumstances, partly driven by the COVID-19 pandemic (Ciascai, Dezsi, & Rus, 2022), demand for this niche market is continuously growing (Pagot, Grilli, & Gatto, 2025).

Local tourist destinations situated within the territories administered by the Apuseni Natural Park (ANP) hold significant potential for achieving high levels of bicycle use as a means of leisure transportation, as well as for implementing and promoting strategies and policies convergent with sustainable tourism. In order to increase the proportion of cycling tourists among the total tourist population and to reduce the negative externalities resulting from the short-term mercantile exploitation of forest resources (with irreversible consequences for the natural environment) the loss of rural identity in mountain areas (ranging from the dilution to the suppression and replacement of vernacular architecture, excessive urbanization, and the uncontrolled change of land use categories through the expansion of built-up areas, among others), what is needed is not only an integrated policy framework at various levels of administrative organization, but also scientifically grounded studies capable of substantiating the prevalence of sustainable tourism forms with genuine long-term and medium-term benefits for local communities. Given the abundance of tourist resources (natural, tangible cultural, and intangible cultural) within the area under analysis, alongside their insufficient valorization, and coupled with the openness of local authorities towards community development, an excellent opportunity has emerged to underscore the need for a comprehensive research programme aimed at identifying instruments for harnessing the tourism potential of the ANP through mountain cycling tourism, as well as the surplus of residential space and locally produced goods available in the households of local residents. As detailed in this study, the benefits for members of the local community may be substantial.

1.2. Research Aim, Objectives, and Hypotheses

Aim

To conserve tourism attractiveness, valorize and protect the rural-mountain territorial heritage (both natural and social). To increase the economic efficiency of households situated in rural-mountain areas within the territories administered by the ANP. To apply sustainable types and forms of tourism within the ANP (specifically mountain cycling tourism).

Objectives

(1) To identify the profile of the mountain cycling tourist;

(2) To identify instruments for the superior valorization of the surplus residential space and locally produced goods available in the households of local residents;

(3) To develop a conceptual and methodological framework for facilitating the implementation of mountain cycling tourism infrastructure, with particular emphasis on the utilization of existing access routes and the limitation of their proliferation, with the aim of achieving the sustainable valorization of the territorial heritage under analysis.

Research Hyphoteses

(1) The profile of the mountain cycling tourism practitioner aligns with the behaviour of the environmentally friendly tourist, desirable within protected areas;

(2) The mountain cycling tourist contributes to increasing the economic efficiency of households situated within the territories administered by the ANP, through a more effective valorization of the surplus residential space and locally produced goods;

(3) Cycling tourism contributes to the valorization of undeveloped access routes (forest roads, rural tracks, and footpaths), entailing minimal costs;

(4) Mountain cycling tourism infrastructure stimulates local economies;

(5) Mountain cycling tourism can contribute to the pecuniary compensation of landowners whose properties are situated within protected areas;

(6) The increase in household economic efficiency, through the practice of tourism-related activities as a secondary occupation, encourages the sedentarization of the local population in their places of origin;

(7) Mountain cycling tourism valorizes and contributes to the conservation of the tourism attractiveness of the rural-mountain territorial heritage (economic, social, and environmental).

1.3. Structure of the Thesis

This thesis, grounded in the need to develop the mountain cycling tourism environment, analyzes the potential of existing access routes to connect tourist attractions and points of

interest and to revitalize rural communities, with priority given to isolated ones, within the ANP, employing both qualitative analysis methods and quantitative data, with the aim of establishing a strategic approach as an instrument of sustainable development for the region under analysis.

The thesis is structured into six chapters (Fig. 1), opening with the present chapter, the Introduction, in which the rationale for the topic selection is presented, the aim and objectives are defined, and the research hypotheses are formulated.

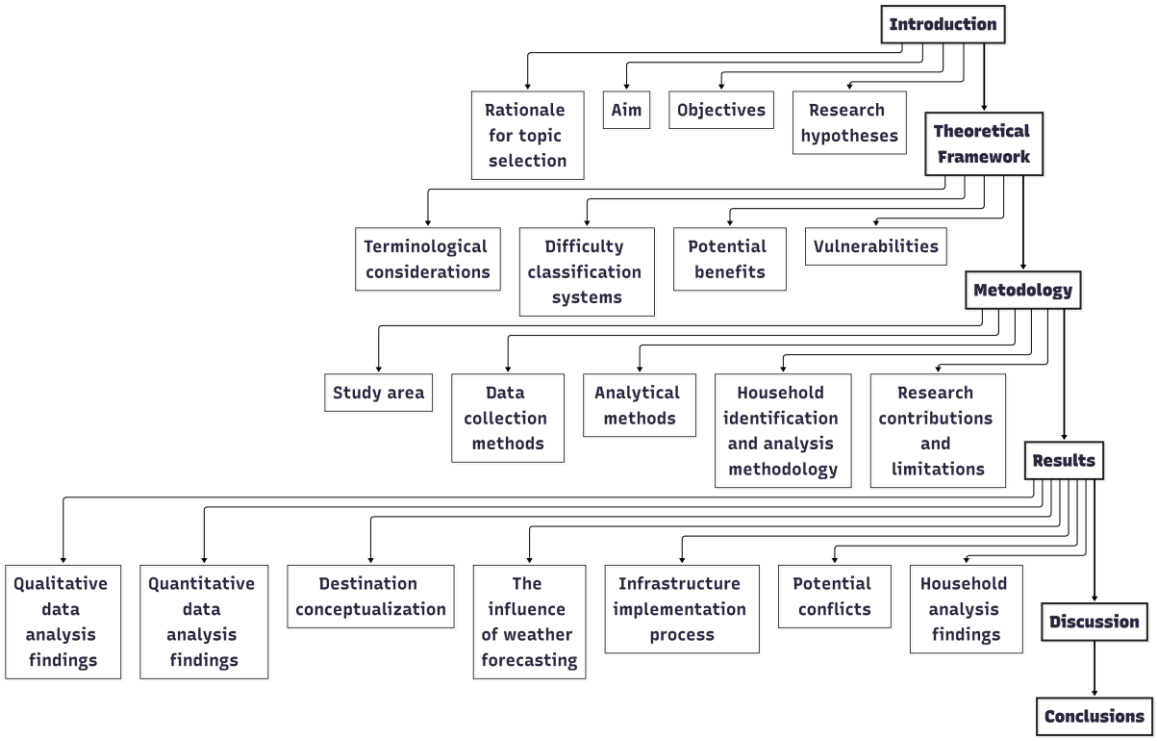

Fig. 1. Schematic representation of the paper's structure

The following chapter, the Theoretical Framework, presents a synthesis of the reviewed literature through an examination of the principal terminological considerations and relevant concepts, focused on the presentation of the main difficulty classification systems applicable to MTB trails, as well as an elucidation of the potential benefits attributed to cycling and cycling tourism. This chapter concludes with the deconstruction of the myth that cycling tourism constitutes a "universal panacea", by reviewing the vulnerabilities identified in association with this form of active tourism.

The methodology is described in Chapter 3, which opens with a concise delineation of the study area. Subsequently, the qualitative and quantitative data collection methods are presented, including the use of interviews and semi-structured questionnaires, the analytical

methods employed, as well as the methodology utilized in the identification and analysis of households with a view to establishing their suitability for engaging in tourism-related activities as part of the local tourism offer. This chapter also addresses the author's perspective as a practitioner with regard to the methodology of implementing the dedicated infrastructure. The section on research contributions and limitations concludes the methodological dimension of the thesis.

The Results chapter presents the principal findings and provides answers to the research questions. It opens with statistical data concerning the population within the administrative-territorial units (ATUs) situated within the territories administered by the ANP. From a systemic perspective that acknowledges the bidirectional interaction between supply and demand, scientifically grounded research proceeds from the most comprehensive possible understanding of demand. In this regard, the findings of both the qualitative data analysis (thematic analysis) and the quantitative data analysis, through the variable involvement of respondents in the mountain cycling subculture and the influence thereof on the formation of attitudes, delineate the profile of the mountain cycling tourist, highlighting the behavioural and consumption patterns associated with this leisure activity. Subsequently, an original and innovative approach is presented concerning the conceptualization of destinations in mountain cycling tourism and the influence of weather forecasting on the decision to undertake a dedicated trail, a factor of primary importance in the design of a personalized mountain cycling tourism product. The implementation process, with its logical sequence of stages, together with the proposed trails, constitute the fundamental backbone of mountain cycling tourism infrastructure implementation, presented within a dedicated stand-alone subchapter. The identification of potential conflicts among access route users enables the development, on a solid foundation, of management strategies aimed at eliminating or reducing such conflicts, with the purpose of enhancing the overall tourist experience. Subsequently, the section on household analysis from the perspective of integration into tourist circuits provides a detailed assessment of the potential for valorizing the surplus of locally produced goods and residential space, illustrated by way of demonstrative examples, with the declared aim of structurally correlating these households with the proposed mountain cycling tourism infrastructure.

The Discussion chapter represents the culmination of the research, resulting from the application of complex mechanisms of systematic hypothesis verification, examining in detail the extent to which the empirical evidence supports or contradicts the modelled theoretical predictions. Furthermore, this chapter explores the conceptualization of destinations and the influence of weather forecasting on the design of the mountain cycling tourism product. The

Conclusions chapter summarizes the principal findings, offers observations regarding the implications and potential relevance of the research results for stakeholders, and suggests new directions for future research.

2. Theoretical and Conceptual Framework

This chapter examines in depth certain theoretical and operational aspects addressing a contiguous approach, with a complementary purpose, as a foundation with regard to applied research in the field of mountain cycling tourism and the valorization of territorial heritage.

2.1. Terminological Considerations

Territorial Heritage

The definition of the syntagm territorial heritage arises within the context of a tendency towards the substantiation of the term into a concept. Thus, the heritage representation of the territory acquires new valences. In recent decades, the utilization of this concept has expanded at a global level. Territorial heritage has been transformed from a simple group of strictly delimited elements (natural constituents) into a broader consideration, adding new components such as tangible and intangible cultural heritage with an emphasis on territorial identity (Panzera, 2022).

Cycling Tourism

The legislation currently in force in Romania defines cycling tourism as a recreational tourist activity, accessible to all categories of tourists, in which travel is performed by bicycle (Government Decision No. 441, 2022). The European Union (EU) considers cycling tourism to be an integral part of the tourist experience and refers specifically to travel by bicycle between localities for leisure purposes (Weston et al., 2012, p. 7). According to the Explanatory Dictionary of the Romanian Language, cycling tourism is a branch of tourism in which travel is performed by bicycle (Dexonline, 2021).

Lumsdon, cited by Lamont (2009), characterizes cycling tourism as a leisure activity by bicycle, ranging from an occasional day trip or sub-day excursion to a long-distance journey (Lamont, 2009). Sustrans (1999), a charitable organization administering the largest cycling trail network in Great Britain, defines cycling tourism as leisure visits, whether day visits or overnight stays away from home, that involve recreational cycling as a fundamental and significant part of the visit. The same organization identifies three types of cycling tourism: (1) Cycling Holidays, defined as holidays, for both domestic and international visitors, in which cycling represents the primary purpose of the holiday; (2) Holiday Cycling, referring to cycling during a holiday, consisting of day bicycle rides undertaken by both domestic and international visitors during a holiday away from their place of residence, with cycling being one of the activities undertaken during the holiday; (3) Cycling Day Visits, defined as trips from home,

outside a person's usual place of residence, involving either departure from home by bicycle or travel by car or train for a full-day or half-day bicycle ride (Sustrans, 1999, p. 1).

The Cycling Tourist

Simonsen et al. (1998) are among the pioneers of research directed towards the identification of the demographic profile of the cycling tourist. In their work, a cycling tourist is defined as a person of any nationality who, at some point during their holiday, uses the bicycle as a means of transport and for whom cycling constitutes an important part of that holiday. Not included are short trips to the "corner shop", local residents cycling for recreational or other purposes, and cyclists for whom cycling competitions represent the principal characteristic of their visit, given that the primary purpose of the holiday is sporting competition (Simonsen, Jorgensen, & Robbins, 1998, p. 21). The same authors propose a more extensive formulation of the definition, whereby cycling tourists may be classified according to their level of commitment to the practice of cycling tourism.

Cycling tourists may cycle with the idea of movement in mind (Shipway & Stevenson, 2012; Bull, 2010; Tomino, Peric, & Wise, 2020), motivated by the desire to maintain excellent physical fitness, or they may cycle in order to live tourist experiences based on profound feelings of satisfaction (Hardy, Buning, Boudreau, & Thomas, 2023; Rus, Dezsi, & Ciascai, 2023). Under these circumstances, motivation may shape not only the profile but also the broadening of the definitional basis of the cycling tourist.

A cycling tourist should be defined as a person who is away from their city or country of origin for a period of at least 24 hours or undertakes at least one overnight stay, with the purpose of spending a holiday or vacation, and for whom the use of the bicycle as a means of transport constitutes an integral part of the holiday or vacation, organized independently or potentially forming part of a commercial tour, and may include the use of transport support services and any type of formal and/or informal accommodation; while a recreational cyclist should be defined as a person engaged in any recreational activity or bicycle excursion away from their place of permanent residence, undertaken within a period of less than 24 hours or without an overnight stay, and for whom cycling is considered a positive mode of leisure time utilization (Ritchie W., 1998, pp. 568-569).Another approach regarding profile as a basis for identifying cycling tourist typology is segmented according to the modality of accommodation access. Thus, following their research, Simonsen et al. (1998) identify the nomadic cycling tourist, who changes their place of accommodation multiple times during the holiday, and the cycling tourist who accommodates in the same location, who uses that location as a point of departure and arrival during the excursion (Simonsen, Jorgensen, & Robbins, 1998).

Mountain bike (MTB)

The mountain bicycle (MTB) is constructed to withstand demanding conditions of use. There are several identifying elements that characterize mountain bicycles: a robust frame; certain models are equipped with front fork suspension, while others feature frame suspension (the more technical and uneven the trails, the greater the need for suspension); the handlebar is generally flat; the rims/wheels have a diameter ranging between 26 and 29 inches (until recently, the vast majority of MTBs were equipped with 26" rims; currently, the most popular models are equipped with 27.5" and 29" rims); wide tyres with pronounced tread; the front drivetrain has been reduced, in recent years, from 3 chainrings to a single chainring (the number of teeth varies significantly according to the type of bicycle use); the rear drivetrain features multiple sprockets for bicycles used for climbing (up to 12 sprockets).

Electrically Assisted MTB (e-MTB or Pedelec)

Assimilated to the bicycle are pedal-assisted vehicles equipped with an auxiliary electric motor with a maximum continuous rated power not exceeding 250 W, whose assistance is interrupted when the cyclist ceases to pedal or is progressively reduced as the speed of the vehicle increases, being completely interrupted before the speed of the vehicle reaches 25 km/h, as well as mopeds as provided for in Regulation (EU) No. 168/2013 (Portal Legislativ, 2020). The electrically assisted mountain bicycle, hereinafter referred to as e-MTB, is a bicycle with a battery-powered motor that provides the cyclist with the possibility of selecting the level of assistance by switching between different modes, which is activated only to the extent that the pedals are engaged and ceases when the speed of 25 km/h is reached (Rérat, 2021; Cherrington & Black, 2023).

Adapted Mountain Bicycle (aMTB)

Adapted mountain cycling (aMTB), sometimes referred to as "off-road paracycling", encompasses a wide range of cyclists who are typically unable to use a standard mountain bicycle and require adapted equipment and trails suited to their physical, intellectual, neurological, and sensory abilities (Heil, 2024). Various adapted mountain bicycles are available, each designed to meet the specific needs of an individual cyclist. Among the adapted equipment already in existence are: handcycles, horizontal leg-cycles, and tandem bicycles (Break the Boundary, 2024).

MTB Route and Trail (mountain bike route/trail)

Mountain cycling trails refer fundamentally to all authorized mountain cycling trails that rarely contain more than 30% asphalt content and include singletrack trails (narrow-width trails that do not permit two cyclists to travel side by side), forest roads, and mountain paths

(Lower Austria). The typology of MTB trails is as follows: cross-country (often in circuit form but also linear, combining forest road trails, paths, and unidirectional segments, which on certain sections may include high difficulty levels); downhill (trails with very steep gradients, high and extreme difficulty levels, requiring high riding speeds, exceptional technical skills, and the use of a specialized bicycle); bike park and dirt park trails (relatively short trails featuring numerous jumps, berms, ramps, etc.); unidirectional/singletrack trails (trails on narrow paths of varying widths, often among trees) (Forestry and Land Scotland, 2024; CBI, 2022); adaptive trails (MTB trails with an obstacle-free riding surface, accessible to cyclists using adapted/recumbent bicycles or hand-powered bicycles) (MTB Glossary, 2023). Singletrack trails enjoy the greatest popularity among all existing trail types, being considered important and very important in the opinion of users (Lotze, Stöhr, & Zimmermann, 2014).

Mountain Cycling Destination

The term mountain cycling destination is commonly used to identify a community or trail system that is sufficiently entertaining, attractive, interesting, and unique to draw individuals from other communities, whether from proximate communities, from within and/or outside a given state (Carsten, 2023).

In the specialized literature (Ritchie & Hall, 2011; Goeft & Alder, 2009; Weed, 2007; Lamont, 2009), the concept of primary and secondary destinations is not always addressed explicitly with exclusive reference to mountain cycling tourism, but may be inferred from general works on tourism, cycling tourism, and mountain recreation. Ritchie (2011) does not explicitly classify destinations as primary and secondary, but analyzes the structure of itineraries and trails, underlining the importance of principal attractions and intermediate points from the perspective of the cycling tourist's experience; Goeft (2009) raises the issue of infrastructure connecting destinations, investigates the impact of mountain cycling tourism, and the necessity of structuring trails around primary attractions (for example, long-distance trails in mountain areas); Weed (2007) addresses the intersection between cycling tourism, as part of sports tourism, and tourist attractions, highlighting their natural hierarchization; Lamont (2009) explores the connection between mountain cycling and adventure tourism, underlining the importance of primary and secondary points of interest. As a general rule, these concepts are analyzed within the broader tourism context, applicable also to mountain cycling.

Active Transportation

Active transportation (active travel) includes, by way of example, walking, the use of wheelchairs, and cycling (including electric bicycles), and refers to journeys made by means of transport that are propelled entirely or partially by human power, regardless of the purpose of

the journey (Gov.Scotland, 2023). According to the same report, cycling, as a component part of active transportation, is positioned at the upper tier of the transport hierarchy (Fig. 2) and should be prioritized accordingly. Thus, it is important that active travel strategies contain measures supporting both walking and cycling.

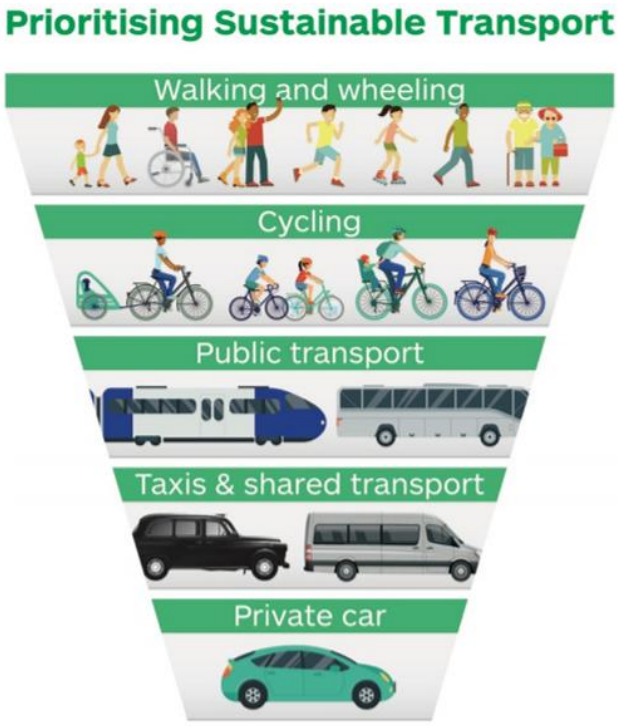

Fig. 2. Ranking of Modes of Transportation (Gov.Scotland,

2.2. Difficulty Classification Systems for MTB Trails

At the European level, no official standard system exists for the classification of difficulty grades with regard to MTB trails. In 2020, not only did at least 15 different MTB trail rating systems exist in Europe, but the procedure for assigning difficulty grades did not always evaluate the same aspects (IMBA, 2020). Nevertheless, following the analysis of the specialized literature, relevant official documents, and difficulty grade evaluation guidelines for MTB trails, the methodology presents numerous common aspects. The important common elements refer generally to the existence of three difficulty classes (blue - easy, red - intermediate, and black - difficult), inspired by the difficulty grades assigned to alpine ski runs, as well as evaluation from the perspective of length, technical character, and riding surface roughness.

The discrepancy in the assignment of difficulty grades across European countries, and even between regions within the same country, with certain destinations employing their own symbols, may create confusion in accessing a trail that corresponds to the skill level of the cycling tourist, often with particularly serious consequences. As evidenced by Fig. 3, the current

principal modalities of representing difficulty grades, mapped onto the International Trail Rating System (ITRS), present a varied palette of symbols.

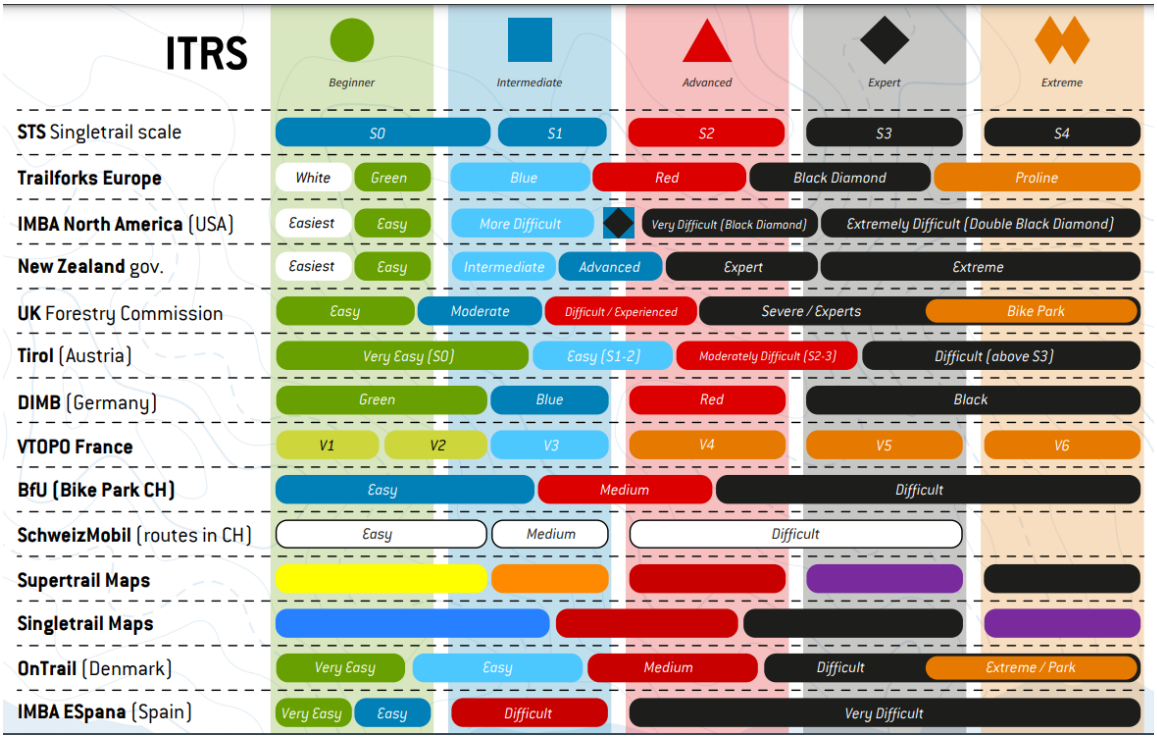

Fig. 3. A rough comparison of the ITRS with the main existing systems (Crumbach & Melchiori, 2023)

2.3. Potential Benefits of Cycling Associated with Cycling Tourism

Cycling tourism in general, and mountain cycling tourism in particular, directly supports the achievement of several SDGs through the following specific contributions: good health and well-being (SDG 3), it improves physical and mental health, reducing risks associated with sedentary lifestyles, and through the reduction of air pollution, contributes to a cleaner environment and the reduction of respiratory diseases; decent work and economic growth (SDG 8), it generates local economic opportunities, supporting small entrepreneurs and communities through services such as bicycle rental, guiding, and eco-friendly accommodation, and contributes to the diversification of tourism in rural and mountain areas; sustainable communities (SDG 11), it supports the development of cyclist-friendly infrastructure, contributing to sustainable mobility, and stimulates rural regeneration through the promotion of less frequently visited destinations; responsible consumption and production (SDG 12), it encourages ecological tourism with a reduced environmental impact, promoting responsible

resource consumption; climate action (SDG 13), it reduces greenhouse gas emissions generated by motorized transport and contributes to reducing dependence on fossil fuels, constituting an ecological and sustainable alternative; life on land (SDG 15), it promotes tourism with a reduced impact on biodiversity, encouraging respect for natural protected areas and the conservation of ecosystems. Cycling tourism aligns with the principles of sustainable tourism and combines recreational needs with responsibility towards the environment and society, contributing to the development of local communities from an economic, social, and environmental perspective.

2.3.1. Potential Socioeconomic Benefits

From an economic perspective, understanding the value of cycling tourism implies an approach to the cycling industry as a whole: bicycle production, spare parts and accessories, cyclist clothing, protective equipment, dedicated infrastructure, etc.

An overview of the bicycle, parts, and accessories manufacturing industry at the level of EU member states reveals the following situation: 1,000 companies, the majority of which are small and medium-sized enterprises; the sector's turnover amounted to approximately EUR 21.2 billion; the entire cycling value chain in Europe, encompassing production, retail trade, cycling infrastructure, cycling tourism, logistics, sharing services, etc., accounts for 1.3 million jobs, which under optimal conditions of public and private sector development may reach 2 million by 2030 (CONEBI, 2024).

Studies have demonstrated that persons who travel actively (by bicycle and/or on foot) spend more in local shops than users of the majority of other modes of transport (Rajé & Saffrey, 2015). Furthermore, mountain cycling tourism, considered a tourist transport facility, represents a valuable and growing tourism market, on the basis of its contributions to the tourist economies of rural communities, particularly in villages traversed by cycling routes (Richard & Matthew, 2020; Lumsdon, 2010). Cycling tourists will spend at least as much in a rural area as other types of tourists (Sustrans, 1999).

The benefits for society generated by cycling, and implicitly by cycling tourism, may also be quantified through the advantages they present for the health of practitioners, as well as through their monetization with an impact on the reduction of expenditure from national health budgets.

2.3.2. Potential Environmental Benefits

The development of cycling tourism infrastructure within natural protected areas represents an essential element for the preservation of biodiversity conservation and contributes to the development of the local economy.The development and promotion of cycling for

utilitarian and recreational purposes are particularly important for the social and natural environment, as part of climate objectives. Thus, cycling is considered a sustainable and healthy mode of transport, contributing significantly to the process of transport decarbonization, while simultaneously constituting a principal instrument employed in achieving the objective, shared by EU member states, of reducing greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels (EUR-Lex, 2021), and of achieving climate neutrality (zero pollution) by 2050 (EUR-Lex, 2022), with substantial benefits across numerous other domains.A study by the European Commission estimated negative externalities attributed to road transport at EUR 800 billion per year, while cycling generates positive externalities, for the environment alone, of over EUR 18 billion (Table 10) at the level of EU member states (ECF, 2016). The positive externalities of cycling, across all tiers (environmental, social, economic, etc.), are considerably greater, amounting to approximately EUR 182.5 billion per year (ECF, 2018). Increasing bicycle traffic volumes with the aim of reducing the negative externalities of motorized road transport emerges as a sine qua non requirement.Accordingly, the potential economic, social, and health benefits, at both the practitioner and/or societal level, attributed to cycling, resulting from the studies presented, may be attributed, to a certain degree, to cycling tourism in general and to MTB cycling tourism in particular.

2.4. Vulnerabilities of Cycling Tourism

The principal vulnerabilities of mountain cycling tourism have been identified as: inadequate infrastructure, accidents attributed to the practice of this activity, controversial aspects regarding e-MTB as a sustainable mode of transport, relatively pronounced seasonality, potential conflicts among the principal users of access routes in the rural mountain environment, as well as legislative aspects that fail to account for the continuously evolving current needs of cycling tourists.The legislative provisions currently in force regarding the modality of exploitation of natural mountain areas may give rise to diversity and the extent of potential conflicts. Thus, outdoor activities based on the right of public access may cause excessive use and free-rider problems, as well as conflicts between landowners and visitors (Saito, Mitsumata, Bergius, & Shimada, 2022).

3. Methodology

3.1. Study area

The selection of the ANP area as the study zone is not coincidental, but is rather linked to the current controversies surrounding tourism development in protected areas and the existence of an extensive network of access routes — both internal and emergent — (approximately 930 km according to the ANP administration) that remain insufficiently valorized; aspects which may constitute the catalyst for initiatives directed towards the sustainable viability of the territory. The varied topography of the area enables the utilization of existing access routes and future mountain cycling tourism trails suitable for all categories of practitioners, ranging from the least experienced to experts.

Within the territories administered by the ANP, the commune of Gârda de Sus — with a focus on the geographical area of Poiana Călineasa — together with its constituent villages, possesses numerous reference tourist attractions and points of interest belonging to the natural framework. At the same time, the cultural heritage, both tangible and intangible, is identified as the epicentre of the customs and traditions of the Moți people. The prevalence of this area's selection as a study zone, from a tourism perspective, was determined by the establishment of the Ecomuseum of Țara Moților.

With regard to the extrapolation of the results of the studies presented within the framework of this thesis, the similarities identified with the other administrative-territorial units situated within the ANP area justify the selection of the Poiana Călineasa geographical area as a referential study zone. This selection is grounded in convergent aspects such as: the existence of numerous insufficiently valorized access routes (yet suitable for cycling), the surplus of residential space and agricultural produce available in the households of local residents, the relatively high levels of pauperization among certain segments of the population, comparable demographic characteristics, as well as the pressing need for the implementation of tourism forms compatible with the preservation of the natural environment. Furthermore, the strategic potential of the Poiana Călineasa area to function as a central hub for mountain cycling tourism within the ANP region confers upon this zone particular importance in the context of the development of this significant form of tourism at the regional level.

The Apuseni Natural Park is situated in western Romania, in the central-northwestern part of the Apuseni Mountains, a territory overlapping the Bihor Massif to the south and the Vlădeasa Massif to the north, spanning the administrative territory of three counties (Cluj 40%, Bihor 32%, Alba 28%), with a total area of 76,064 hectares across the administrative territory

of 16 communes, encompassing 53 localities in their entirety and three holiday villages (Boga, Fântânele, and Vârtop) (ANP, 2024). The settlements are predominantly dispersed in their structure, and in total approximately 10,000 persons reside within the boundaries of the ANP (Imecs, Mathe, & Kohan, 2022).

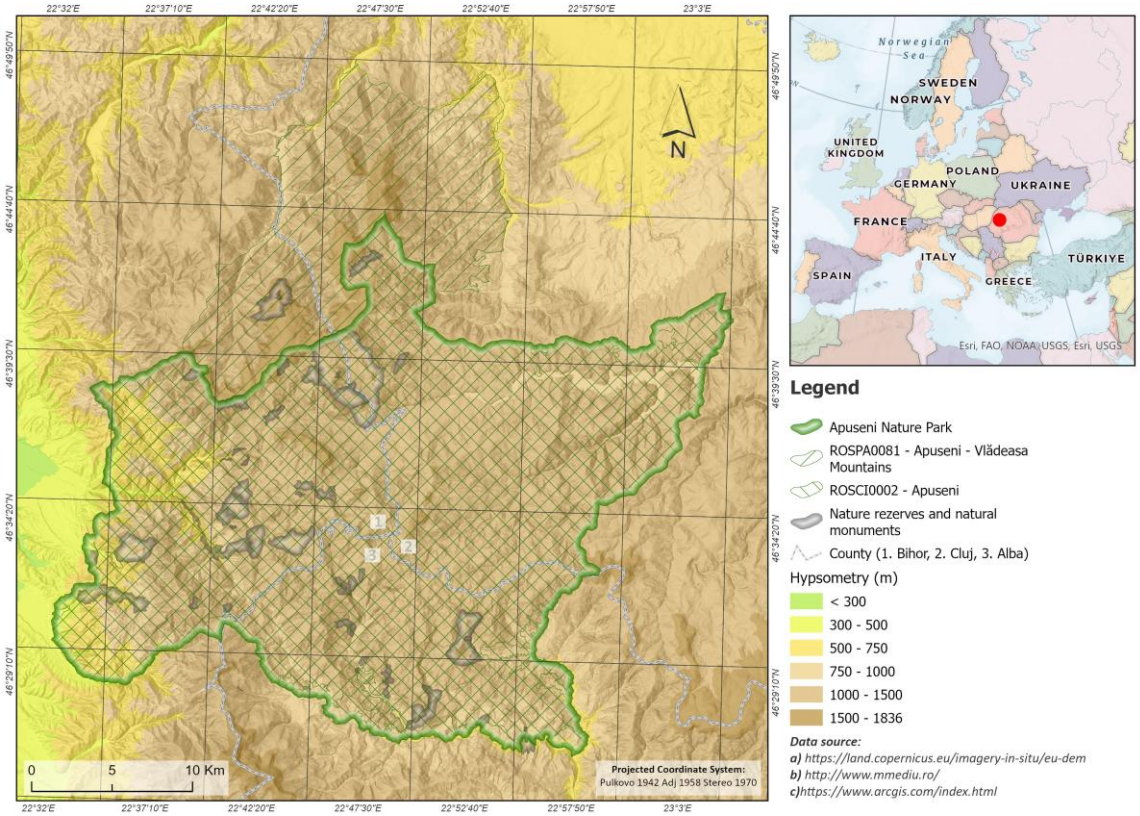

Fig. 4. Geographic representation of the study area (PNA)

3.2. Systematic Review of the Specialized Literature

Analiza sistematică a literaturii de specialitate în vederea identificării lucrărilor relevante pentru tema abordată s-a realizat prin accesarea Web of Science Core Collection (WoSCC), Scopus, EBSCO. Criteriile de selecție au inclus exclusiv publicații în limba engleză, fără aplicarea unor restricții temporare.

The systematic review of the specialized literature, conducted with a view to identifying works relevant to the topic under investigation, was carried out by accessing the Web of Science Core Collection (WoSCC), Scopus, and EBSCO. The selection criteria included exclusively publications in the English language, without the application of any temporal restrictions.

Within the framework of the literature selection process, the PRISMA model was applied, enabling the standardized and rigorous analysis of the information flow, thereby reducing the risk of methodological bias (Moher, Liberati, Tetzlaff, & Altman, 2009). Within

the academic databases (e.g. WoSCC), at the first tier of interest, the search string employing the keywords "mountain bike tourism" generated 102 works, predominantly research articles (55); in order to capture a broader area of interest, the keyword "mountain bike" was employed, yielding 616 works, of which 432 were research articles. The second tier of interest is represented by the identification of works examining related themes, such as research methods in tourism and specifically in mountain cycling tourism, thematic analysis, accidents in mountain cycling, among others. Subsequent to the identification process, duplicates were eliminated and works were included in the final list on the basis of relevance.

Furthermore, the strategy encompassed search activities beyond academic databases, with the aim of including information sources provided by relevant institutions, cycling and cycling tourism associations and clubs, the Eurostat database and that of the National Institute of Statistics (NIS — Tempo Online), Local Development Strategies (with emphasis on the tourism component), among others. Additionally, in order to ensure comprehensive coverage of recent research, the databases of scientific publishers were accessed (Elsevier, Taylor & Francis, Springer, PubMed, etc.), as well as the websites of universities hosting journals analyzing outdoor activities, management plans of protected areas, and cycling infrastructure implementation strategies.

3.3. Research Structure

The data triangulation approach, as a research methodology, consolidates qualitative findings by demonstrating the convergence of independent sources, amalgamating the concepts of corroboration and validation (Decrop, 1999). With a view to constructing the clearest possible picture of the mountain cycling tourism environment, the research as a whole pursued data triangulation, integrating a mixed-methods approach through the combination of quantitative and qualitative methods with the observation method.

3.3.1. Data collection

Table 1. Principal Data Sources Employed in the Data Collection Process

Primary sources
Survey respondents (cyclists)
Experienced cyclists (with at least 10 years of experience) who were interviewed
Family members in the households surveyed
Field observations
Secondary sources
National Institute of Statistics (NIS) and Eurostat statistics
Local and regional policy documents
PNA Management Plan
Studies cited in the literature
Master plans and strategies for the development of cycle tourism

Geospatial sources
Mapping databases
Orthophoto maps
GPS tracks

3.3.2. Techniques and Working Instruments

Questionnaire

The first working instrument employed was an online questionnaire (Google Forms), which was open for completion during the period 4 May – 6 June 2023, comprising 29 items, with 185 responses validated. Closed-ended questions were used to collect socio-demographic information from respondents (age, sex/gender, professional category, and level of education), as well as a portion of the information identifying the respondent profile (respect for the environment, awareness of the existence of conflicts, and knowledge of the modalities for managing them). This method enabled the systematic collection of data regarding the profile, motivations, and behaviour of cycling tourists in the mountain environment. The cross-sectional approach facilitated the descriptive and inferential analysis of the characteristics specific to this active tourism segment, in accordance with studies from the academic literature. Thus, the study conducted by Newland and Robertson (2018) analyzes aspects related to tourist perceptions in the context of a mountain bike sporting event, and from the perspective of the demographic characteristics of the sample, the research includes respondents with a mean age of 42.2 years, with a standard deviation (SD) of 11.63 (Newland & Robertson, 2018).

Interview Guide

A second working instrument employed was the interview guide, utilizing the semi-structured interview technique (Rotariu & Iluț, 1997), the purpose of which consisted in identifying the behavioural and consumption patterns in the domain of mountain cycling tourism, as well as in gaining a deeper understanding of the important constituent elements of a dedicated infrastructure considered to be of superior quality, or conversely, obstacles of a restrictive nature.

With a view to identifying the preferences of mountain cycling tourists regarding dedicated infrastructure, 15 semi-structured interviews were administered (Appendix 1), each lasting between 40 and 60 minutes, conducted face-to-face through the audio recording of respondents and online via the Zoom application, subsequently transcribed verbatim in electronic format and/or on paper. The interviews — conducted with the prior informed consent of all participants — followed a protocol of open-ended questions designed to encourage respondents to adopt a colloquial narrative approach without filters (for example: there are no

wrong answers, state the first ideas that come to mind, share your experiences aloud). The research focused on cross-country mountain cycling tourism practitioners. The interviews were conducted between September 2024 and January 2025, with mountain cycling tourists with a minimum of 8 years of practice (the majority having more than 10 years of practice), covering a diverse professional background: university academic staff, sales managers, an IT programmer, an environmental expert within local public administration, a bike shop manager, a sports goods store manager, a legal professional, among others. The request for interview participation was addressed to 16 individuals, of whom 15 accepted. The high acceptance rate reflects a heightened interest, with a predilection towards research, aimed at the refinement of the mountain cycling tourism environment.

The questions were formulated and structured to cover five principal aspects of analysis, reported to the research objectives and hypotheses of the thesis.

(1) The cycling tourism experience and the psycho-emotional dimension encompass questions enabling the capture of the experiences, emotions, and perceptions associated with mountain cycling tourism; (2) Aspects related to technical preferences and trail characteristics were obtained through the formulation of questions centred on the justified preferences of practitioners regarding route and trail configuration; (3-4) Cycling tourism typology and logistical and organizational aspects are explored through responses to questions aimed at understanding the manner in which respondents organize and plan their cycling tourism trips and integrate MTB riding into their daily lives; (5) The economic dimension of cycling tourism is captured through the formulation of questions specific to consumption behaviour and the quantification of budgets allocated to accessed services. It should be noted that certain questions exhibit cross-cutting characteristics, being amenable to integration across multiple aspects under analysis.

In the final section of the interview, subjects related to the establishment of priorities on narrow shared-use trails were addressed, as well as aspects concerning the definition of cycling tourism destinations into categories of primary and secondary destinations. Furthermore, the influence of weather forecasting on the decision to undertake a cycling tourism trail was discussed, with exclusive emphasis on weather forecasting per se rather than on the actual meteorological conditions prevailing on the day of the trail. The respondent was encouraged to propose new evaluation criteria according to the importance attributed to them, as well as to assign new criteria for each individual difficulty grade.

3.3.3. Sampling

Within the framework of the present thesis, the sampling process is grounded in elements of both probabilistic and non-probabilistic sampling (Ahmed, 2024) and was carried out in a staged manner, encompassing clearly established methods with respect to both qualitative and quantitative research (Fig. 5).

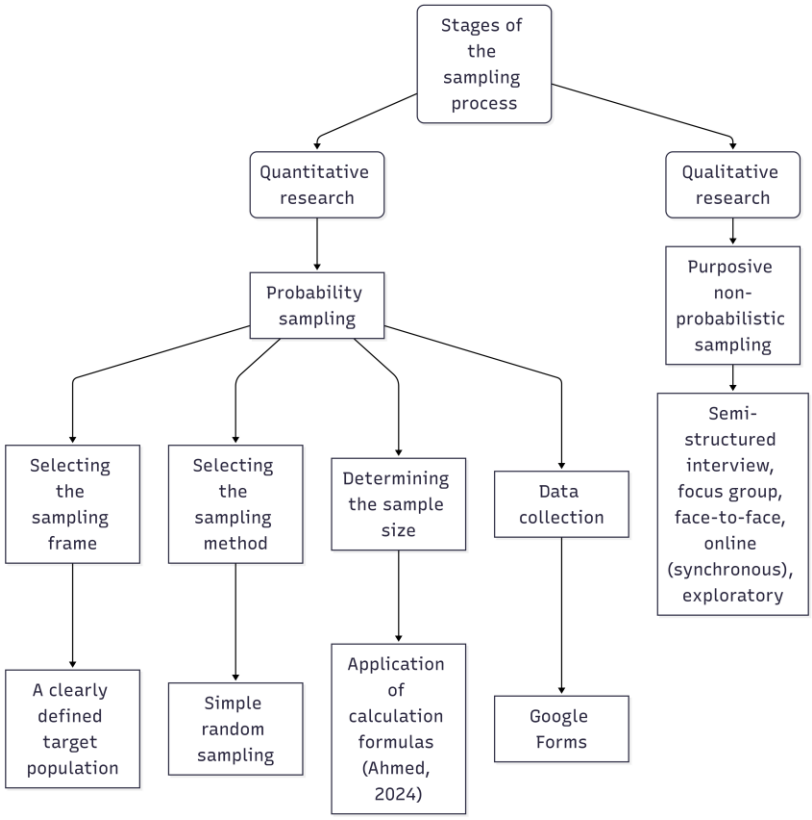

Fig.5. The stages of the sampling process in qualitative and quantitative research

The determination of sample size represents an important component of research (Douglas, 1990), and the application of the correct formula determines the representativeness of the sample and minimizes error (Rodríguez & González, 2014).

3.3.4. Data Anaysis

3.3.4.1. Thematic Analysis

The qualitative data analysis, within the framework of the present thesis, was conducted through the application of the thematic analysis method, based on the systematized version developed by Braun and Clarke (2008), comprising six principal stages outlined in Table 2.

Table 2. Stages of the thematic analysis process

Stage 1
Reviewing the data

Transcribing the data provided by respondents, reading and re-reading the data, and jotting down initial impressions and ideas.
Creating a framework for the thematic analysis process
Stage 2
Identifying the main themes
Identifying relevant aspects of the data provided by respondents
Highlighting interesting features of the data in a systematic manner by organizing the data into meaningful groups
Continuous analysis to refine the specifics of each theme and assign clear labels to each theme
Formulating themes in relation to the research hypotheses
Validarea temelor prin matricea de corespondență între ipoteze și teme
Evaluarea corespondențelor între temele identificate și ipotezele de cercetare prin analiză matriceală
Stage 3
Identifying subthemes for each main theme
The questions and corresponding answers are analyzed, potential response patterns are identified, and secondary themes are proposed; the secondary themes are then refined, and potential emerging subthemes are identified.
Identifying relationships between themes using a correspondence matrix
An in-depth examination of the relationships between the main themes: highlighting key relationships, demonstrating their complex and interconnected nature.
Stage 4
Identifying common and divergent patterns
Identifying the areas where respondents agree (common patterns) versus the areas where there are significant differences of opinion.
Stage 5
The response coding system
It serves as a methodological bridge between the data processed up to this point and subsequent theoretical interpretations.
Developing the coding system structure involves the prior thematic analysis as a foundation for developing relevant codes that allow for the efficient identification and classification of responses.
Collecting data relevant to each code.
Identifying instances of the codes in the collected data.
Applying codes to text
Selecting representative responses for each main theme; applying the coding system developed in the previous stage and identifying patterns and relationships among the codes.
Stage 6
Validating the relationships between codes, themes, subthemes, and hypotheses
An integrated analysis of the multiple relationships among the identified codes and the validation of research hypotheses.
Final analysis of the selected excerpts, and reporting of the analysis in relation to the research hypotheses.

3.3.4.2. Quantitative Analysis

This important stage of the research requires a dual approach. On the one hand, a series of data provided through the interview will be subjected to analysis; on the other hand, the data obtained through the administration of the questionnaire. With regard to the analysis of the data

obtained through the interviews, a significant portion was subjected to thematic analysis within the qualitative analysis framework, while another portion of the data will be analyzed from a quantitative perspective. In this context, the analysis process commences with a systematic approach to coding and thematic analysis from a quantitative perspective; subsequently, the data provided by the quantitative component of the interview (closed-ended questions) were analyzed through descriptive statistics (mean, median, standard deviation, variance). The data represent responses, on a Likert scale ranging from 1 (minimum agreement) to 5 (maximum agreement), to the closed-ended questions (1–6) within the interview (Appendix 1).

3.4. Potential for Conflict Index (PCI)

The calculation of the PCI (Manfredo, Vaske, & Teel, 2003) facilitates the understanding and application of findings as follows: it simultaneously conveys information regarding central tendency, dispersion, and the shape of a distribution; it employs a graphical presentation, thereby enabling the straightforward assimilation of research results; it places findings within the context of managerial concerns, such as the identification of areas of disagreement among stakeholders and the quantification of the potential for conflict regarding resource management decisions. This approach minimizes the effort required for information processing and enhances the understanding of complex concepts, such as motivations, attitudes, and norms in domains such as leisure, human dimensions, and natural resources (Vaske, Beaman, Barreto, & Shelby, 2010).

A 7-point scale was required to determine the level of conflict (ranging from completely non-existent to major). In this regard, scenarios were created to present the occurrence of potential conflicts targeting mountain cyclists during encounters with the parties involved: mountain cyclists and hikers, ATV users, residents, forestry workers, landowners, shepherds, and wildlife.

The PCI was employed to establish the degree of acceptance of management actions aimed at mitigating potential conflicts. In this context, a 7-point ordered scale was utilized (−3, total disagreement; 0, neutral; 3, total agreement) (Manfredo, Vaske, & Teel, 2003).

$$PCI = \left[1 - \left| \frac{\sum_{i=1}^{n_a} |X_a|}{Xt} - \frac{\sum_{i=1}^{n_u} |X_u|}{Xt} \right| \right] \times \frac{Xt}{Z} \qquad (1)$$

PCI= Potential for Conflict Index

X_a = an individual's "acceptable" (e.g., 1, 2, or 3) score;

n_a = all individuals with acceptable scores;

X_u = an individual's "unacceptable" (e.g., −1, −2, or −3) score;

n_u = all individuals with unacceptable scores;

Z = the maximum possible sum of all scores = n x extreme score (e.g., Z = 3n); n = total number of subjects;

n = total number of subjects;

where:

$$Xt = \sum_{i=1}^{n_a} |X_a| + \sum_{i=1}^{n_u} |X_u| \qquad (2)$$

The PCI methodology provides a standardized measure ranging from 0 (total consensus) to 1 (maximum potential for conflict). The highest potential for conflict (PCI = 1) occurred when responses were distributed equally between the two extreme values of the scale (e.g., 50% highly unacceptable and 50% highly acceptable); a distribution of 100% at any single point on the response scale resulted in a PCI = 0 and suggested a minimal potential for conflict (Vaske, Beaman, Barreto, & Shelby, 2010). The following descriptive statistics were employed for data analysis: mean score (MS), median, mode, standard deviation (SD), variance, skewness, and kurtosis. For the statistical analysis of binary data (Yes/No), the value 1 was assigned to "Yes" and 0 to "No", after which standard calculation formulae were applied.

3.5. Methodology for the Identification and Analysis of Households with a View to Establishing Their Suitability for Engaging in Tourism-Related Activities

In the process of identifying households suitable for introduction into the tourist circuit as tourist reception structures (TRS) with accommodation and public catering functions (local gastronomic points), a series of eliminatory criteria were developed in the first phase. Thus, aspects such as the architecture of the buildings (the dwelling house and outbuildings), exterior and interior cleanliness, and positioning relative to access routes (all identified access routes, regardless of their importance and role/function), proved determinant. Furthermore, the attitude of the family members belonging to the household under analysis towards tourism in the area, and implicitly towards tourists, was taken into consideration, as well as the existence of a surplus of residential space and agricultural produce, and the availability of time on the part of family members for agritourism activity.

Following the application of the eliminatory criteria, 12 households were analyzed with a view to their introduction into the tourist circuit. Eight households are situated within the administrative perimeter of the ATU of Gârda de Sus (territories within the ANP), while 4 households are situated outside the territories administered by the ANP, of which 2 are located

in relative proximity to the area under analysis (the locality of Rogojel, Săcuieu commune). Subsequently, by applying the analysis methodology and comparing the values of the indicators of each household with those of the reference household, a total of 6 households were selected. With regard to the pertinent decision to analyze households situated outside the ANP territories, this is justified within the context of destination connectivity, which derives from the specific nature of mountain cycling tourism activity — namely, the coverage of relatively extensive areas through recreational cycling.

The scope of the present thesis does not permit a high level of detail with regard to the presentation of the results obtained from the analysis of all households examined. Accordingly, a detailed presentation of the results obtained from the analysis of the household considered most relevant, and simultaneously representative of good practice, was adopted. The methodological foundation underlying the analysis of the agricultural holding is the Methodology for the Development of the Agritourism Development Project for an Agricultural Holding (Pastor, 2006).

3.6. The Author's Particular Position from an Emic Perspective

The analysis adopts an emic perspective (from within the group of practitioners) with the aim of capturing the meanings and subjective senses attributed to the experience, as formulated by the respondents. According to Jennings (2010), the emic approach, centred on the viewpoint of those directly involved in the phenomenon under study, is preferred within the interpretive framework (Jennings, 2010). This is accompanied, evidently, by reduced involvement in the interviewing of respondents and the subsequent significant minimization of subjectivism, so as to avoid biased interpretation (Moularde & Weaver, 2016).

The present research is marked by the dual posture of the author as both an academic researcher and an active practitioner of mountain cycling tourism.

4. Results

4.1. Analysis and Interpretation of Qualitative and Quantitative Data

4.1.1. In-Depth and Systematic Thematic Analysis

Within the framework of the present thesis, thematic analysis — as a method of systematic interpretation of qualitative data — enables the identification, organization, and understanding of the principal patterns within the analyzed dataset, obtained through the administration of the interview. In order to facilitate a deeper understanding of the research findings, the principal themes are grouped and iterated in this section: T (1) Mountain Cycling Tourism Experience and the Psycho-Emotional Dimension (EVC); T (2) Technical Preferences and Trail Characteristics (TIC); T (3) Mountain Cycling Tourism Typology (TPC); T (4) Logistical and Organizational Aspects (LOC); T (5) Economic Dimension and Local Impact (ELIC).

4.1.1.1. Identification of Secondary Themes for Each Principal Theme

Cycling Tourism Experience and the Psycho- On the basis of the responses to the questions pertaining to (T1), four sub-themes were identified, along with a series of emergent sub-themes corresponding to each sub-theme (Fig. 6).

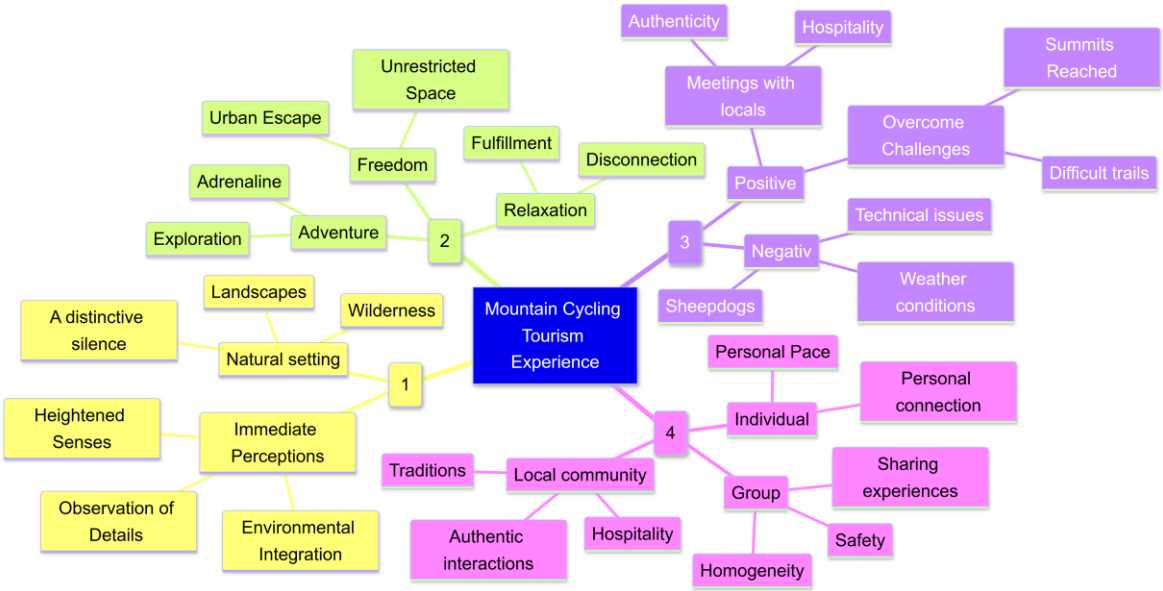

Fig.6. Subthemes and related emerging subthemes (T1)

(1) Connection with nature and the mountain environment: a profound sense of connection with nature, heightened perception of the surrounding environment, appreciation of tranquility and landscapes;

(2) Dominant emotional states: freedom, relaxation, and disconnection from urban daily life, a sense of fulfillment, adventure through exploration and adrenaline;

(3) Positive memorable experiences: authentic interactions with local residents, overcoming personal challenges, discovery of new places. Negative memorable experiences: encounters with sheepdogs at shepherd stations, meteorological challenges, technical and physical difficulties;

(4) Social dimension: the importance of a homogeneous group, preferences for individual and group cycling, interaction with members of the local community.

Technical Preferences and Trail Characteristics (T2)

The analysis of the responses pertaining to theme (T2) reveals five sub-themes reflecting the preferences of mountain cycling tourists and highlighting the importance of trail adaptability to different needs and contexts:

(1) Trail typology: dominant preference for ridge/crest trails and forest roads, valorization of wild and isolated areas, importance of diversity in trail types;(2) Trail profile: majority preference for ascent-descent alternation, choice of longitudinal profile and distance primarily influenced by travel duration, the presence and weight of luggage, as well as the physical condition of the practitioner;(3) Riding surface: pronounced preference for off-road and unprepared surfaces (as presented in their natural state), with paved surfaces accepted exclusively for connectivity and trail withdrawal purposes;(4) Predefined trails: acceptance within the context of protected areas, conditional upon aspects such as diversity and sufficient number, adequate technical configurations for all practitioner categories, and access to tourist attractions;(5) Trail flexibility: willingness to extend rides on off-road/unpaved terrain, with limiting factors influenced by degree of fatigue, total journey duration, weather conditions, and the technical condition of the bicycle.

Cycling Tourism Typology (T3)

Following the detailed analysis of the responses to the questions pertaining to the principal theme (T3), four principal directions were identified characterizing the behaviour and cycling tourism experience, each integrated within specific sub-themes. The classification presented below highlights the manner in which cycling tourism is integrated into the lives of practitioners, as well as the factors influencing this integration:

(1) Organizational patterns: strong preference for nomadic cycling tourism, while hub-and-spoke cycling tourism is approached as an alternative, combined with other activities;

(2) Frequency of practice: focus on weekends, limited utilization during weekdays, dependence on temporal factors;

(3) Integration into daily life: predominantly recreational utilization, alternative transportation for certain practitioners, adaptation to urban/rural context;

(4) Constraints and limitations: work schedule, inadequate infrastructure, safety and security, seasonality.

Logistical and Organizational Aspects (T4)

Within the framework of the thematic analysis centred on the logistical and organizational aspects of cycling tourism, three principal sub-themes were identified. The detailed analysis of these sub-themes provides a well-defined picture of the manner in which cycling tourists structure their activities, manage their travel, interact with local accommodation services and associated facilities, and offers aspects related to pre- and post-ride information gathering, as well as aspects pertaining to trail monitoring:

(1) Information and planning: trail preparation from the perspective of criteria such as distance, difficulty, key points or points of comfort/discomfort, pre- and post-trail documentation, monitoring and analysis;(2) Transportation and travel: preference for personal vehicle to the destination, non-motorized travel at the destination, group organization (2–4 persons);(3) Accommodation and facilities: preference for traditional/authentic accommodation units, importance of interaction with the host, context-based facility hierarchy.

Economic Dimension of Cycling Tourism (T5)

In the analysis of the economic dimension of cycling tourism, the research identified three distinct sub-themes providing a detailed perspective on the economic behaviour of cycling tourists and their impact on local economies. These sub-themes reveal specific expenditure and consumption patterns, demonstrating a complex dynamic between the duration of cycling tourism activity, accommodation preferences, and interaction with the local economy. The analysis of these sub-themes enables an understanding of the manner in which cycling tourists manage their financial resources and the ways in which they contribute to the economic development of the destinations visited.

(1) Cheltuieli alimentare: diferențiere clară între excursii de o zi și cele cu înnoptare, creșterea dependenței de produse locale odată cu durata șederii, buget influențat de disponibilitatea serviciilor.

(2) Cheltuieli cazare: buget mediu consistent între respondenți, variații bazate pe tipul de unitate preferată, camping ca alternativă economică.

(3) Pattern-uri de consum: adaptabilitate la context local, preferință pentru produse și servicii locale, evoluție temporală a comportamentului de consum.

Mountain cycling tourism presents certain particularities, in the sense that some segments, or in their entirety, mountain trails do not traverse localities, or the possibilities for purchasing food products and even sources of drinking water are absent. Under these circumstances, the planning of trail-related details requires particular attention and the direct recommendations of experienced practitioners. The form of mountain cycling tourism analyzed in the present thesis shares numerous aspects embedded within mountain adventure cycling tourism. The planning of the proposed trails, spanning several days, takes into account the presence of supply sources (food and water), with priority given to the nomadic mode of operation.

4.1.1.2. Theme Correspondence Matrixteme

The in-depth examination of the relationships between the principal themes enables the identification of key relationships, demonstrates the complex and interconnected nature of the mountain cycling tourism phenomenon, while simultaneously revealing the manner in which its different aspects mutually influence and reinforce one another. Thus, the following key relationships were identified between the principal themes: experience influences technical preferences and practice style, typology impacts logistical aspects and consumption patterns, technical preferences and logistics influence the economic dimension (Fig. 7).

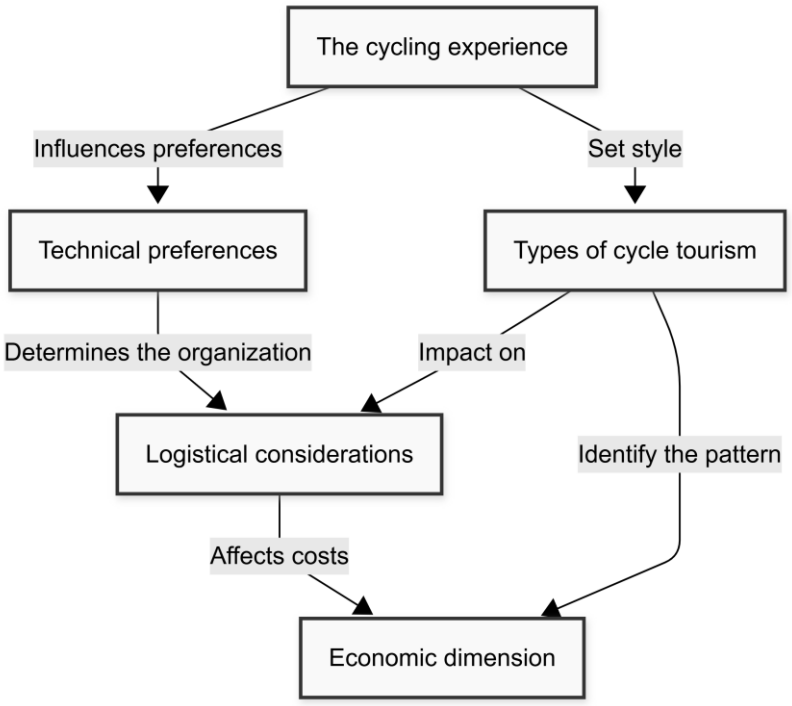

Fig.7. Matrix of relationships between themes

4.1.1.3. Identification of Common and Divergent Patterns

In the thematic analysis process, an essential stage consisted in the identification of common and divergent patterns, with direct implications for the verification of certain research hypotheses. Initially, this analysis identified a first set of patterns reflecting both the common elements and the behavioural and preferential differences from the perspective of mountain cycling tourists. Thus, three dominant common patterns emerged: a pronounced preference for the natural environment and unprepared trails, a tendency towards an increasing proportion of local consumption proportional to length of stay, and the consistent valorization of interaction with the local community. In parallel, the analysis highlighted, in certain instances with significant emphasis, three divergent patterns: variability in pre- and post-trail information-seeking behaviour, differentiation of consumption behaviour on day trips, and, with lesser intensity, diversity of preferences regarding travel to the destination. Subsequently, this initial set of patterns was subjected to a process of refinement and deepening, leading to a more nuanced and comprehensive taxonomy of characteristics, detailed in a structured manner in Table 3.

Table 3. Common and divergent behavioral patterns

Common patterns	
1. Accommodation preferences	Agritourism farm/host family, as the first choice.
	Valuing interaction with the host.
	Appreciating local products.
2. Average behavior	Preference for unpaved trails, as they appear in their natural state.
	Respect for nature.
	Avoiding negative impacts on the natural environment.
3. Local consumption	The gradual increase in the length of stay influences the consumption of local products.
	Greater willingness to consume traditional products.
	Support for the local economy
Divergent patterns	
1. Information and Planning	
2. Preferences for travel to the destination	
3. Budget allocated for meals during shifts/day trips	

4.1.1.4. Response Coding System

The proposed coding system represents a methodological bridge between the data processed up to this point and the subsequent theoretical interpretations. The structure of the coding system covers all the principal themes identified previously and aims at the systematic verification of the research hypotheses. This analytical dimension provides the capacity to facilitate the deepening of behavioural patterns, both common and divergent, the relationships

between the different interconnected dimensions of mountain cycling tourism, with potential for the sustainable development of rural mountain areas situated within natural protected areas.

The detailed structure for ***Experience and Values Codes (EVC)*** enables the systematic organization of responses and the pertinent assessment of the relationships between cycling tourism and the natural environment and local community, providing the methodological toolkit necessary for understanding the profound motivations and personal impact of the cycling tourism experience upon participants.

In order to transcend the purely experiential perspective, ***Technical and Infrastructure Codes (TIC)*** represent an essential pillar for facilitating the understanding of the mountain cycling tourism phenomenon. The development of the code set for this dimension enables the detailed identification and mapping of the interaction between cycling tourists and the existing access route infrastructure, as well as of the specific preferences regarding riding surface, technical amenities, and equipment utilized.

Capturing the heterogeneity of mountain cycling tourism necessitates the development of a set of codes targeting the practice dimension of this form of tourism. In this regard, ***Typology and Practice Codes (TPC)*** enable the classification of practice types, with emphasis on nomadic, hub-based, and mixed forms, providing a taxonomy of this activity.

Logistical and organizational aspects are essential in the planning process, the choice of means of transport, the selection of accommodation units, and the management of information, significantly influencing the mode of operation and the experiences associated with mountain cycling tourism. In order to map this dimension, the detailed structure of ***Logistics and Organization Codes (LOC)*** was developed, enabling the analysis of planning and organizational processes, revealing the strategies expressed by cycling tourists in the preparation and conduct of specific activities in this regard.

From the perspective of the sustainable development of the local community, the economic interactions between cycling tourists and host communities, consumption patterns, and the economic impact generated, represent essential elements for understanding the role of cycling tourism as a potential vector of local development. In order to analyze this complex dimension, the specific set of ***Economic and Local Impact Codes (ELIC)*** enables the analysis of consumption and expenditure patterns, the systematic evaluation of direct and indirect economic impact, the understanding of the manner in which local resources are valorized, as well as the identification of local development potential through the highlighting of opportunities for developing locally-adapted development strategies from a cycling tourism perspective.

4.1.1.5. Application of Codes to Text/Responses

This analytical stage necessitates the following systemic methodological approach: the selection of representative responses for each principal theme; the application of the coding system developed in the preceding stage; and the identification of patterns and relationships between codes

4.2. Mountain Cycling Tourism Infrastructure Implementation Process

The mountain cycling tourism infrastructure within the ANP is structured on a hierarchical architecture comprising four principal categories, reflecting a functional progression from fundamental necessities towards the advanced dimensions of the tourist experience (Fig. 8).

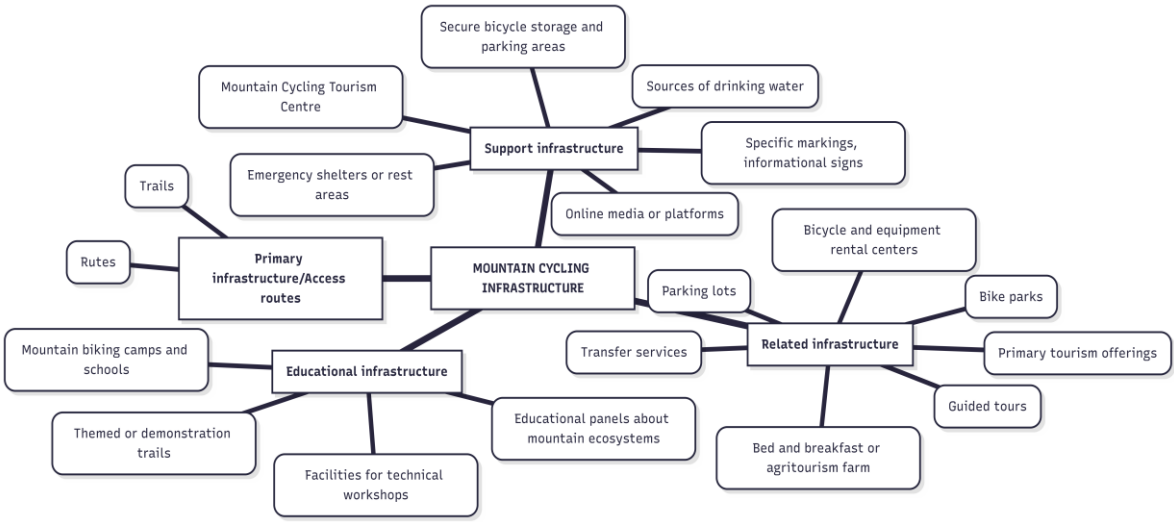

Fig.8. A summary overview of the components of mountain cycling infrastructure

Primary infrastructure ensures the minimum and basic conditions necessary for the conduct of cycling tourism activity, continuing with support infrastructure, which consolidates and optimizes the practice of this form of active tourism. Together, these two categories form the essential nucleus of the system, constituting the indispensable foundation for the functioning of mountain cycling tourism. Furthermore, the component elements of the primary and support infrastructure form the foundation upon which the classification of mountain cycling tourism infrastructure is attributed. At the subsequent tier is situated the ancillary infrastructure, which transcends basic necessities and contributes to the qualitative enhancement of the cycling tourism experience through complementary services and facilities that diversify and enrich the tourism offer. The educational dimension, a form of infrastructure oriented towards sustainable development objectives ensures, on the one hand, the balance between tourist valorization and

the protection of the natural and cultural heritage, and on the other, contributes to the formation of a category of tourists who practice environmentally friendly forms of tourism.

The complex process of implementing mountain cycling tourism infrastructure involves the successive completion of five principal stages. (1) The exhaustive identification of access routes. The following stage consists of (2) the application of the specific methodology with a view to selecting access routes suitable for mountain cycling, from a multifactorial analytical perspective. (3) The selected access routes are refined through reference to the preferences and needs of mountain cycling tourists, after which (4) the structural correlation between access routes and local households, as future agritourism farms, is established. Following the completion of these stages, through which the access routes that "qualify" for introduction into the category of mountain cycling tourism routes and trails are finalized, the process advances to stage (5) of trail classification, which encompasses the assignment of technical difficulty grades, the determination of the recommended physical fitness level, the degree of risk exposure, and the level of isolation/wilderness of the trails.

4.2.1. Trail Classification

The method of evaluating the technical difficulty of a trail is carried out across five tiers: trail length; trail width; surface grip and maximum transverse gradient; longitudinal gradient; bends, natural step-type obstacles, watercourses, and permanently wet surfaces. In addition to technical difficulty, the complex process of trail evaluation also encompasses aspects related to: the level of physical fitness required for completing the trail; the level of risk exposure in the immediate proximity of the access route and/or riding surface; the availability of permanent drinking water sources; and the level of mobile telephone service coverage.

The difficulty levels describe the characteristics of mountain cycling tourism trails under normal conditions of use. Depending on a series of factors — extreme drought, excess precipitation, altitude, time of year, snow, and frost — trail difficulty may increase considerably and involves aggravating circumstances. Furthermore, the user must always be aware of the specific hazards of mountain areas (extreme meteorological phenomena, falling rocks and trees, etc.), which may occur at any moment in the proximity of the access routes utilized by cycling tourists. Under these circumstances, the evaluation criteria are indicative in nature.

Another important aspect is represented by the interpretation of the trail classification method from the perspective of e-MTB users. In this context, evaluation elements such as the mean longitudinal gradient — and under certain conditions, the maximum gradient over short distances — and the level of physical fitness required for completing the trail carry entirely different connotations compared to the conventional MTB user (without electric assistance).

Thus, although the elevation difference is overcome with greater ease on an e-MTB, this evaluation element (mean longitudinal gradient) remains of importance with a view to managing energy consumption and the attention devoted to the energy storage capacity of the batteries. With regard to the maximum gradient over short distances, the e-MTB user must pay particular attention to these values, as approaching trail segments under conditions of a less favourable riding surface combined with a gradient exceeding 10–15% requires considerable technical skills on the part of the cyclist.

4.2.2. Proposed Mountain Cycling Tourism Trails

The development of the mountain cycling tourism trail network within the ANP constitutes the materialization of the conceptual and methodological framework for the implementation of the dedicated infrastructure, elaborated in the preceding stages of the research. The presentation of the proposed trails validates the feasibility of implementing cycling tourism infrastructure in the study area, provides an operational instrument for infrastructure designers, and informational support for cycling tourists. The proposed network is structured on two complementary levels: local trails, aimed at achieving a more effective valorization of the tourism potential belonging to the ANP area, and regional trails and/or routes, which ensure connectivity with neighbouring mountain destinations, facilitating the integration of the ANP into the broader circuit of mountain cycling tourism within the Apuseni Mountains. From a total of monitored trails, the trails presented in detail in this chapter were selected to illustrate the diversity of the potential cycling tourism offer within the ANP.

Without overloading the presentation with redundant information, and on the grounds of optimizing the structure of the present thesis, this section pursued, on the one hand, the demonstrative approach through exemplification, and on the other, the synthetic perspective of the integral implementation of mountain cycling tourism infrastructure within the ANP.The demonstrative approach through exemplification focuses on a selective number of trails representative of typological and geographical diversity, as well as the variety of classification possibilities for access routes suitable for inclusion in the future dedicated infrastructure, thereby providing a considerably clearer picture of the cycling tourism potential of the ANP. The selection ensures coverage of the principal trail typologies identified, offering replicable models for the subsequent development of the network within the area under analysis, as well as in other areas with similar characteristics. The trails presented in detail illustrate the manner in which the proposed implementation process validates: the exhaustive identification of access routes; the application of the specific methodology with a view to selecting access routes

suitable for mountain cycling; the reference to the preferences and needs of mountain cycling tourists; and the trail classification method.

4.3. Potential Conflicts Among Access Route Users

The nature of conflicts in mountain biking can be understood through established theoretical frameworks: interpersonal/goal interference conflict arises when the physical presence of one individual interferes with the objectives of another (Carothers, Vaske, & Donnelly, 2010), while social values conflicts occur when groups do not share the same norms regarding a particular activity (Miller & Vaske, 2016).

4.3.1. Identification of the Level of Conflict Among the Parties Involved

Educational initiatives (MA 2) demonstrate the highest level of acceptance (MS 2.6) with remarkable consensus (PCI 0.022), further confirmed by the lowest standard deviation (SD 0.9) among all actions, indicating consistent and strong support for informational approaches to conflict resolution. In contrast, the charging of cyclists (MA 4) faces clear opposition (MS -1.3), with significant division (PCI 0.249) and considerable response variability (SD 2.0), while the limitation of travel to pre-established routes (MA 6) presents both a negative reception (MS -0.6) and the highest potential for conflict (PCI 0.476), coupled with the highest standard deviation (SD 2.2), suggesting widespread disagreement regarding route restrictions.The research findings substantiated the hypothesis according to which respondents experienced different levels of conflict in relation to: hikers, ATV operators, local residents, forestry workers, landowners, domestic animal breeders, and wildlife. Understanding the impact of inter- and intragroup confrontations on satisfaction regarding recreational activities is an important aspect of public land management for recreation (Schroeder, Fulton, Cornicelli, & McInenly, 2020).

4.4. Household Analysis from the Perspective of Integration into Tourist Circuits

Following the studies conducted, the surplus of agricultural produce within the context of the households analyzed is insufficiently valorized, and for the most part is sold on the local market. Thus, it was established that the selling prices obtained by family members for certain products fall below the average prices on the relevant market. This gives rise to the need for enhancing the valorization of the surplus agricultural produce through the identification of new modalities — not solely through direct sale on the local market, but also through utilization as raw materials for the preparation and/or sale of products to tourists.Mountain cycling tourism can contribute to increasing the economic efficiency of households situated in rural mountain areas — one of the hypotheses formulated within the present thesis, which is to be validated or invalidated. The principal guests of the agritourism farms projected for establishment are

forecast to be mountain cycling tourists. From this perspective, the number of projected overnight stays was calculated, considering the dual approach of 42 and 91 overnight stays per calendar year, respectively, to be reasonable.

The comparative analysis of the profitability rate, as the principal index of economic efficiency pertaining to the valorization of the surplus agricultural produce originating from the household (commodity production) through the traditional selling method and valorization through the projected agritourism activity, represents the culmination of the agricultural holding analysis. The agritourism development project, in addition to the more efficient valorization of commodity production, also offers the valorization of the surplus residential space. The comparative approach to the profitability rate analysis results provides an overview of the current and projected economy of the agricultural holding under analysis. Furthermore, it may constitute the catalyst for the expansion of activities within the holding and, to a certain degree, the sedentarization of family members in their place of origin.

Table 4. Comparative analysis of the rate of return on the production of goods sold through traditional sales channels versus those sold through agritourism

No. crt	**Method of utilization**	**Comm. prod. value**	**Prod. costs**	**Gross Margin**	**Profitab. rate %**
0	**A**	**1**	**2**	**3**	**4**
1	Traditional sale	126091.1	42564.5	83526.61	**196.24**
2	Revenue generation through agritourism over 42 days	42840	6215.19	36624.81	**589.28**
3	Revenue generated through agritourism over 91 days	92820	13446.24	79373.76	**590.30**

The analysis of income parity from agritourism activity — as a projected complementary income source for family members — constitutes a comparative evidence method of the income generated from agritourism activity relative to the national mean gross income for the year 2024. Due to certain particularities deriving from the difference in the reporting period, 12 months (366 days) in the case of agricultural production, and 42 and 91 days respectively in the case of agritourism activity, the calculation of income parity may generate certain ambiguities. Consequently, the reference period is 12 months, even though the effective period during which the gross margin (the difference between revenues and expenditures) is generated is considerably shorter. The measurement of results was dichotomized according to the number of days accessed by 6 tourists at the projected agritourism farm, comprising 42 days and 91 days respectively. This yields a sum of 1,017.36 RON and 2,204.83 RON per month for each of the three active persons respectively. Under

these circumstances, the parity of total current and projected income (from agritourism activity) amounts to 62% in the case of agritourism activity conducted over a period of 42 days, and 77% respectively for activity conducted over a period of 91 days. A significant increase in the income parity index is observed in the 91-day variant.

5. Discussion

5.1. Hyphotesis Testing

Both the results of the thematic analysis and those of the quantitative analysis are essential in the development of research hypothesis testing. Thus, the analysis commences with the correlation of the principal codes identified and the validation of the relationships between the principal themes and the research hypotheses (Fig. 9).

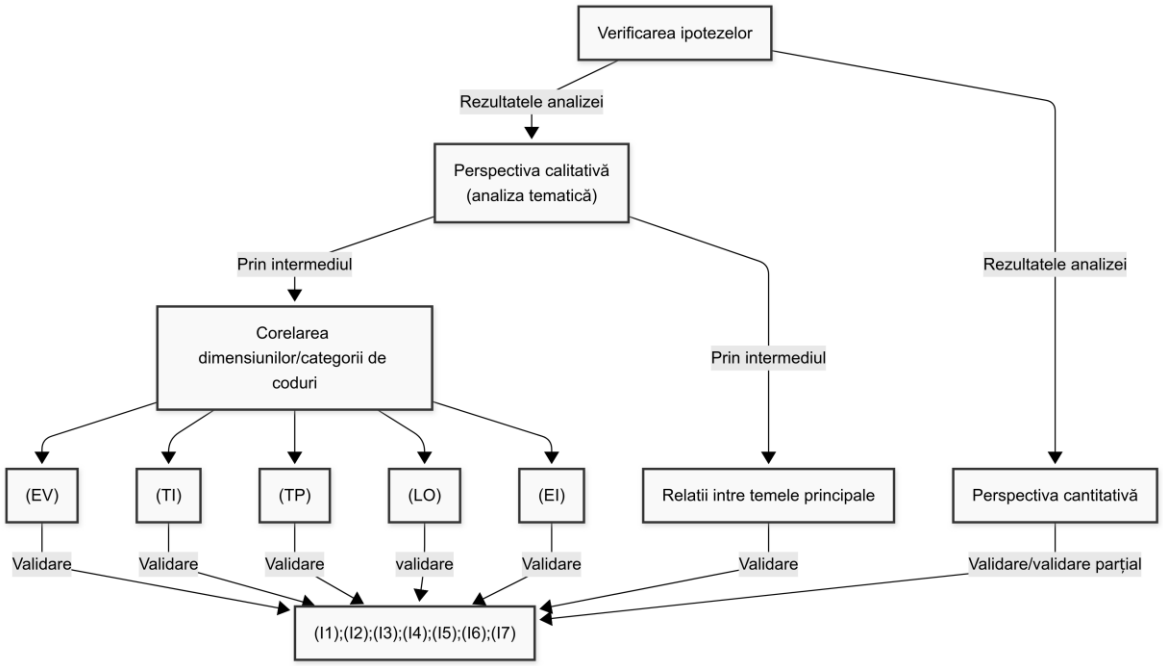

Fig.9. Verificarea ipotezelor de cercetare, reprezentare schematică a fluxului de analiză

5.1.1. Integrated Substantiation of Hypothesis Validation

The corroboration of the results of the thematic analysis, presented previously, with the data resulting from the quantitative analysis consolidates the research hypothesis validation process through the following perspectives: methodological convergence (the conclusions derived from both the thematic and quantitative analyses validate the research methodology employed); quantification of relationships (the quantitative data provide a measurable dimension to the relationships identified qualitatively); identification of predominant patterns (the high frequencies of certain attitudes and preferences confirm that the relationships identified are not isolated, but rather represent dominant behaviours within the cycling tourism community); economic substantiation (the quantification of economic impact provides a solid scientific foundation for the evaluation of the feasibility of the strategic recommendations

derived from the research regarding the implementation of mountain cycling tourism as a vector of sustainable local development).

The extended analysis of qualitative and quantitative data provides support for the differentiated validation, at different levels, of all seven research hypotheses:

(1) Hypotheses 1-4 benefit from robust validation, grounded in both thematic analysis and quantitative data;

(2) Hypotheses 5-6 receive partial validation, the available data providing important empirical indications, yet insufficient for comprehensive validation. The complete validation of these two hypotheses requires the identification of additional data, obtained through specific in-depth research oriented towards the pecuniary compensation of landowners and the reduction of demographic decline through the enhancement of sedentarization in places of origin;

(3) Hypothesis 7 benefits from consistent validation, with multiple supporting elements identified in the analyzed data..

5.2. The Mountain Cycling Tourism Product

The unprecedented technological evolution and the radical and extremely rapid changes in the attitudes and behaviour of mountain cycling tourism practitioners impart a pronounced obsolescent character upon the dedicated tourism product. Under these circumstances, the answer to the question of what a standardized mountain cycling tourism product should look like is inextricable.

Following the in-depth analysis of respondents' opinions, the principal general aspects influencing the decision are: personal context (daily responsibilities, a demanding schedule, and personal needs must be taken into consideration when planning a cycling outing — in other words, the available time both determines and influences the proposed distance to be covered and how far one can cycle); physical and psychological condition (the desirability of and resistance to physical effort differ among practitioners, such that some simply wish to be immersed in nature while others seek performance; consequently, not everyone possesses the same physical condition or the desire to cover the same distances); group composition and dynamics (the purpose of cycling tourism is enjoyment and socialization, not exhaustion, and when conducted in an organized manner, account must be taken of group members with lesser preparation); strategic planning (not only the kilometres matter, but also the route/trail as a whole, the landscape, the stops, and the experiences lived).

From the perspective of the aspects influencing the decision to access cycling tourism routes/trails and destinations, as well as the practitioner profile, the design of a dedicated product becomes a genuine challenge.

The complexity of the market for mountain tourism and other forms of cycling tourism is notable, as is the urgent need to create not more trails, but rather more sophisticated tourism products, including diversified trails, along with attractive leisure infrastructure (bicycle rental, service and repair facilities, attractive localities, accommodation adapted to the needs of mountain cyclists, etc.).

From this perspective, the literature reveals aspects related to economic benefits (Buning & Lamont, 2020), sustainability (Chang & McCreesh, 2022), the integration of new technologies (including electric bicycles) and new portable trail information technologies (Pröbstl-Haider, Lund-Durlacher, Antonschmidt, & Hödl, 2017), the MTB product market and marketing (Buning, Cole, & Lamont, 2019), host community development (Freeman & Thomlinson, 2014), and less focused on the conceptualization of destinations and the influence of weather forecasting on the decision to access a cycling tourism product, aspects which may contribute significantly to the enhancement of the dedicated tourism product.

5.2.1. The Tourism Product from the Perspective of Destination Conceptualization in Mountain Cycling Tourism

The diversity of the ways in which cycling tourists conceptualize destinations represents a fundamental aspect with regard to the design of mountain cycling tourism products. This conceptual diversity complicates attempts at standardizing the terminology of "primary destination", an essential operational concept in conventional tourism product planning. In this context, at the level of communication, the promotional messages integrated into marketing strategies require careful personalization.

The analysis of the manner in which cycling tourists perceive and define destinations is particularly valuable for the development of authentic and adaptable tourism products, more nuanced and effective, with significant support for the strategic planning of cycling tourism within the ANP.

5.2.2. The Influence of Weather Forecasting on the Design of the Tourism Product

Mountain cycling tourism is a form of tourism practiced in areas with rugged relief, variable altitudes, and at times unpredictable meteorological conditions. In addition to the challenges determined by elevation differences and the traversal of isolated areas with less adequate infrastructure, mountain cycling tourism is strongly influenced by meteorological factors. In mountain areas, meteorological conditions may undergo rapid changes and may represent a determining factor for the safety of cycling tourists. The attitudes, relatively divergent and nuanced in certain instances, constitute structural elements that impose an

adaptive stratification of the cycling tourism offer. Weather forecasting thus becomes an important planning element.

For the forecast-sensitive segment (40%), characterized by heightened sensitivity towards meteorological uncertainty, the development of strategies characterized by maximum flexibility is imperative. The implementation of booking policies with extended rescheduling possibilities, correlated with the development of a meteorological information system tailored to cycling tourism trails, could significantly reduce the reluctance of this segment. Complementarily, where feasible, the development of alternative leisure activities less conditioned by weather conditions, or of trails with a reduced degree of exposure to inclement weather, is recommended.

The moderately adaptive segment (33%) is characterized by an attitude conditioned by the availability of alternative solutions, a situation in which the prioritization of support infrastructure and complementary services is recommended. The availability of primary and secondary tourism offer alternatives, complementary to the cycling tourism infrastructure, correlated with the development of alternative trails for different meteorological scenarios, coupled with deliverable messages to practitioners regarding appropriate equipment for variable meteorological conditions, would significantly amplify the attractiveness of the destination for this segment.

For the segment with a high degree of adaptability to weather forecasting (27%), characterized by high tolerance towards meteorological uncertainty, the valorization of the adventure element and the uniqueness of the experience is imperative. The development of specialized support services for extreme conditions, correlated with the promotion of novel experiences in atypical meteorological contexts, could transform meteorological challenges into competitive advantages. Evidently, the recommendations for this latter segment of cycling tourists are valid under conditions that do not involve a high risk factor.

The highest percentage of temporary abandonment of mountain cycling activity due to weather forecasting is recorded for day trips. For these short-duration journeys, the implementation of a booking system with short-term rescheduling possibilities is recommended. The development of alternative trails in proximity to the place of residence, with differentiated exposure to meteorological conditions, would maximize the probability of conducting cycling activity.

For multi-day tours/journeys, characterized by increased logistical complexity due to different meteorological scenarios, the introduction of main trails with withdrawal variants into the tourism product is imperative. The development of combinations of complementary

activities for periods of prolonged instability would significantly reduce the risk of complete cancellations of the planned journey. Compared to day trips, the percentage of abandonment of the planned journey is lower in multi-day tours, with the exception of situations in which the group comprises family members, it is presumed that a decisive factor is represented by the presence of children or persons with limited experience in mountain cycling tourism, and/or under conditions of tent accommodation. Furthermore, cycling tourism product planners must identify and incorporate into the tourism product accommodation units equipped with facilities for washing and drying equipment, as well as for washing and maintaining the bicycle (completing a mountain trail under adverse meteorological conditions may cause defects in certain transmission components of the bicycle if timely remedial intervention is not carried out).

5.3. Interpretation and Contextualization of PCI Results

Following the application of the PCI, the results regarding the degree of acceptance indicate significant differences.

The findings demonstrate that management action (MA 1), peaceful cohabitation through mutual tolerance among parties, as well as (MA 2), education through the promotion of good practice guidelines, are the management measures with the highest degree of acceptance among mountain cyclists.

The management actions for mandating travel on pre-established routes (MA 6) and the introduction of cyclist charging (MA 4) recorded the highest potential conflict index among respondents. The high level of disagreement with (MA 6) and (MA 4) may be associated with more limited exposure to detailed information regarding the impact of the increasing number of tourists travelling by bicycle.

The implementation of (MA 4) may initially be perceived by cyclists as a mercantile infringement upon their interests. The practice of MTB, on the one hand, in privately administered spaces accessed both with and without the permission of landowners may sometimes give rise to conflicts related to property rights (King & Church, 2020). On the other hand, the practice of MTB in spaces with public right of access may generate excessive use and conflicts between landowners and visitors (Saito, Mitsumata, Bergius, & Shimada, 2022). The method of charging cyclists, directly through the payment of an access fee in the geographical areas of the ANP, and/or indirectly through supplementary accommodation charges, is a measure that may financially subsidize landowners who make spaces available for tourist use. Such practices have been implemented and their viability has been demonstrated (Pröbstl-Haider, Lund-Durlacher, Antonschmidt, & Hödl, 2017).

The deviation of cyclists from pre-established trails (MA 6) involves subjecting other surfaces to soil degradation processes and the widening of access routes due to the emergence of new, less justified trails. Furthermore, the development of new technologies in the field (e-MTB) determines an increase in existing formal and informal MTB trail networks (Kuwaczka, Mitterwallner, Audorff, & Steinbauer, 2023).

An integrated perspective on common interests, even if less popular in certain situations, may lead over time to the reduction of tensions and the resolution of more difficult issues among the parties involved and/or interested. In this regard, from the perspective of enhancing the tourist experience through the reduction of potential conflicts, a three-directional approach is proposed, treating the involved and interested parties as opponents rather than adversaries: (1) the concerted development of attractive mountain cycling trails, fulfilling both diversity with regard to technical requirements and sustainability standards, recognized as the most successful visitor management measure; (2) informal socialization meetings between groups practicing various outdoor recreational activities could increase the level of tolerance and satisfaction among members of these groups; (3) the involvement of civil society plays a crucial role as a binding agent between the public and private sectors, with the aim of reducing potential conflicts in the practice of mountain cycling through the mediation of cooperation among decision-makers.

6. Conclusions

The present research originated from the pressing and fundamental need for the sustainable development of mountain cycling tourism as a vector of economic and social revitalization of rural (isolated) communities within natural protected areas. In the context in which a significant proportion of mountain localities within the ANP are confronted with acute phenomena of depopulation, demographic ageing, and economic decline, the research sought to document the extent to which mountain cycling tourism — with priority given to the nomadic type — can offer a viable and sustainable development alternative, capable of valorizing the territorial heritage, generating local income, and connecting isolated communities without distorting their authentic character.

The investigative endeavour materialized in the systematic exploration of the complex relationship between cycling tourism demand and the supply capacity of local communities — expressed through the availability of surplus resources, existing infrastructure, and economic valorization potential. This dual perspective enabled the identification not only of opportunities, but also of constraints, potential conflicts, and the compromises necessary for the functional implementation of the mountain cycling tourism environment in contexts characterized by geographical isolation, non-existent dedicated infrastructure, and socio-economic vulnerability.

The research as a whole was guided by seven interrelated hypotheses, formulated to reflect the multidimensional complexity of the mountain cycling tourism phenomenon. The validation of these hypotheses was accomplished through a methodology combining the observation method with qualitative thematic analysis of semi-structured interviews (N=15) and quantitative analysis through surveys administered to a sample of 185 cycling tourists.The empirical results presented in the preceding chapters largely confirmed the theoretical predictions, highlighting the existence of a distinct mountain cycling tourist profile characterized by environmentally friendly attitudes, willingness to incur significant expenditure within local economies, and openness towards authentic services provided by resident households.The research demonstrates that mountain cycling tourism, with priority given to the nomadic type, can function as an effective instrument of socio-economic transformation of rural-mountain (isolated) communities, facilitating territorial connectivity from a tourism perspective, a more effective valorization of local resources, and providing opportunities for retaining the resident population in their places of origin from a mercantile perspective.

From the perspective of designing and developing cycling tourism products, within the sphere of transformative opportunity, conceptual diversity conditions the creation of versatile

offerings that integrate multiple perspectives. Cycling tourism trails can be designed to simultaneously provide geographical challenges, such as reaching the highest elevation point along the route or key panoramic viewpoints, high-quality sensory experiences (interactions and activities emphasizing the experiential space in accordance with current trends in transformative tourism), and optimal functionality (overnight accommodations aligned with expressed preferences and areas with a high density of tourist attractions), thus mapped onto the different modes of destination conceptualization expressed by respondents.

Analiza influenței prognozei meteo supra deciziilor, în cicloturismul montan, relevă un tablou complex de atitudini, factori contextuali și strategii adaptive. Tot odată, dezvoltarea produselor cicloturistice, prin abordarea diferențiată a segmentelor de cicloturiști identificați, corelată cu dezvoltarea unei infrastructuri adecvate și implementarea unor politici flexibile de rezervare, ar putea transforma provocarea meteorologică într-un avantaj competitiv, în ciuda variabilității meteorologice inerente mediului montan.

O contribuție importantă constă în identificarea și operaționalizarea conceptului de valorificare prin intermediul cicloturismului (infrastructura dedicată) a excedentului de spațiu locativ și a produselor provenite din gospodăriile locale. Cercetarea demonstrează că gospodăriile din localitățile montane izolate dețin capacități de cazare subutilizate (camere neutilizate, anexe reconvertibile) și produc alimente tradiționale (lactate, carne, produse de panificație) care pot fi integrate direct în lanțul valoric cicloturistic, fără investiții semnificative. Această abordare diferă substanțial de modelele convenționale de dezvoltare turistică bazate pe construcții noi și servicii standardizate, oferind o alternativă viabilă pentru comunități cu resurse financiare limitate.

The research also provides original empirical evidence regarding the perceptions and attitudes of cycling tourists towards potential conflicts with other users of shared access routes, as well as the degree of acceptance of conflict management measures. These data enable a deeper understanding of the complexity of the management challenges associated with the use of shared-utility access routes and substantiate the recommendations concerning strategies for minimizing recreational conflicts within protected areas.

Theoretical and Empirical Contributions

The present research makes significant and multidimensional contributions to the specialized literature on the mountain cycling tourism environment and the sustainable development of rural communities within natural protected areas.

The originality of the investigative endeavour resides in the integrated approach to the cycling tourism phenomenon through the lens of the bidirectional demand-supply relationship

(cycling tourists vis-à-vis households and agritourism farms) within a specific context characterized by the absence of cycling tourism infrastructure and pronounced socio-economic vulnerability.

An essential contribution of the present thesis resides in addressing several gaps within the existing body of literature:

(1) The application of a data triangulation method (combining qualitative, quantitative, and observational data) which enables both a solid substantiation of the findings and the systematic validation of the research hypotheses;

(2) Unlike the majority of existing studies that analyze established cycling tourism destinations, the present thesis documents an original case study focused on the Apuseni Natural Park, a mountain territory devoid of formal cycling tourism infrastructure, offering valuable insights into the potential for valorization and development of this sustainable form of tourism in peripheral areas, while foregrounding isolated rural communities;

(3) A distinctive methodological contribution is represented by the application of thematic analysis within the context of mountain cycling tourism research, a domain in which this qualitative technique has rarely been employed in a systematic manner;

(4) The thesis applies a detailed analysis, by way of demonstrative exemplification, of a rural-mountain household, with a view to its introduction into the tourism system as a supply-side element, centred on facilities dedicated to mountain cycling tourism and key mercantile components;

(5) The thesis offers an original theoretical model for the mountain cycling tourism environment by demonstrating the validity of the hypotheses through the analysis of the bidirectional relationships identified between hypotheses, themes, and codes;

(6) The innovative structuring of mountain cycling tourism infrastructure on a hierarchical architecture, conceived in accordance with the logic of the distinctive characteristics of nomadic mountain cycling tourism, and the introduction, within this framework, of educational infrastructure as a strategic dimension;

(7) The novelty of this study resides in the application of the PCI from a cycling tourism perspective, in order to examine the level of agreement regarding the implementation of mitigation strategies for potential conflicts among the principal users of shared access routes within a protected area.

Although the present thesis addresses only a fraction of the gaps identified in the specialized literature, the results it delivers may contribute to the advancement of knowledge and to a deeper understanding of key academic and managerial challenges.

Several of the methodologies developed within the framework of the present thesis may be subject to further refinement through additional interdisciplinary investigations. Ultimately, the exploratory dimension and the findings of the research delineate a series of new directions for future inquiry.

New Directions for Research

Longitudinal studies monitoring the same communities over a period of 5 to 10 years would enable an effective assessment of the economic, social, demographic, and environmental transformations generated by cycling tourism development. Such studies could document potential differentiated trends of evolution or involution, communities that succeed in developing viable strategies versus communities in which cycling tourism development initiatives fail, as well as the identification of the factors that differentiate these trajectories.Last but not least, the expansion of research should systematically incorporate the resident perspective, through dedicated studies exploring in depth the perceptions, attitudes, expectations, and concerns of members of rural-mountain (isolated) communities with regard to cycling tourism development.

Future applied research could contribute to a deeper understanding and refinement of the mountain cycling tourism environment from the perspective of the objectives of the present thesis:

(1) Hypothesis 5 (H5), as evidenced by the findings of the study, is not sufficiently validated. This aspect requires particular attention and new studies strictly focused on this theme, aimed at identifying applied models of pecuniary compensation, both direct and indirect, for landowners whose properties host the primary mountain cycling tourism infrastructure. Furthermore, certain qualitative and quantitative research endeavours could highlight the willingness of cycling tourists to engage in trail management (infrastructure maintenance and improvement) as collateral support contributing to the consolidation of symbiotic relationships between practitioners and landowners. This finding opens new research directions regarding co-participatory models in which users become active participants in the creation and maintenance of the resources from which they benefit.

(2) The validation of Hypothesis 6 (H6) receives consistent support with regard to the increase and diversification of income among household members who choose to valorize their surplus residential space and locally produced goods through tourism as a supply-side activity. However, it remains insufficiently clear whether the mercantile dimension alone is adequate to reduce the migration of the rural population towards urban areas or abroad. In this regard, future studies should document, through structured and in-depth interviews, the motivations of local

residents with respect to their intrinsic volitional desire for sedentarization in their places of origin. The findings thus obtained, corroborated with the benefits attributed to the implementation of mountain cycling tourism infrastructure as revealed in the present study, may contribute to a deeper understanding of the desirable attitude of residents towards remaining an integral part of their rural-mountain local communities.

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