



Sustainable Development of Cycle Tourism Destinations in Croatia based on Innovative e-Tools

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Abstract

Cycle tourism in Croatia is not just a significant economic contributor but also a driver of rural development and job creation in sectors like hospitality, tourism, leisure, and cycle path maintenance. The unique preferences of cycle tourists for authentic experiences and local culture also boost the local economy. This research, with its practical implications, aims to provide a comprehensive understanding of the level of awareness of e-innovation tools in Croatia's cycling tourism sector, identify challenges and potentials in terms of technological change, and highlight infrastructural gaps in Adriatic versus continental Croatia using a SWOT analysis. The insights from this research can be instrumental in fostering sustainable and long-term destination development, making it a valuable resource for all professionals in the field.

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Introduction

The role and importance of active tourism are constantly growing, not only due to increased awareness of the importance of nutrition and health, improvements in sports and recreational infrastructure, and the further development of selective forms of tourism but also due to changes in the habits of tourists and locals (Araújo Vila et al., 2019).

One of the most significant forms of active tourism is cycling tourism (Buning & Gibson, 2018). There are numerous reasons for its continuous development as follows: (i) the possibility of cycling longer distances in a shorter period, (ii) the constant development of infrastructure and accommodation facilities suitable for cyclists and recreationists, (iii) the availability of electric bicycles for all generations, and (iv) awareness of environmental protection and individual carbon footprint (Gonda & Csapó, 2019).

The Netherlands, Germany and Denmark are widely known for their well-developed cycling culture (Pucher & Buehler, 2008), and many other countries are working to follow their lead and develop cycling tourism as well. Destinations that develop cycling tourism outside their urban areas are Spain (Mallorca, Golden Coast), France (Provence, Champagne, Normandy, Alps), Italy (Tuscany, Sardinia, Alps), Austria (Danube region, Alps), and Slovenia (Temjanovski & Popeska, 2020).

The potential of cycling tourism has also been recognised by Croatia, Cyprus and Malta, which have been promoting and developing it for the past couple of years (Azzopardi & Nash, 2013; Poljičak et al., 2021). However, looking at the national tourism context, Adriatic and Continental Croatia developed different types of tourism (Medvet et al., 2020). There is a significant difference in the number of tourist arrivals and overnight stays, types and amount of accommodation facilities, and thus income and resources for further tourism development (Bartolucic et al., 2016).

The primary goal of this work is to determine the level of awareness of the local community and key tourism stakeholders about the importance of e-innovations in cycling tourism and to see if there is a difference in the potential for further development of active tourism in Adriatic and Continental Croatia. The purpose of the paper is to point out the importance of e-innovations for the development of active tourism and how they can significantly help in the development of less developed areas, such as Continental Croatia.

The paper is organised as follows. In the introduction, the authors state the goals and purpose of the work. In addition to the above, the authors state the significance of the topic and its implications for the economy and society. In the second chapter, the authors state the definition of cycling tourism, the segmentation of cycling tourists, its niche segmentation, the definition of sustainable tourism and the connection of innovative e-tools with active tourism. In the third chapter, the authors analyse the challenges and potential of innovative e-tools for the sustainable development of cycling tourism destinations in Croatia.

Cycling tourism in Croatia

Categories of cycling tourism

One of many definitions of cycling tourism is a travel activity involving a bicycle for pleasure (Lamont, 2009). A tourist is any person who spends at least one night in an accommodation facility other than his place of residence for rest or recreation, work, health, studies, or sports (United Nations, 2008). Since the definition itself is broad, there are various categories when talking about cycling tourism.

According to their frequency of riding, cycling tourists are divided into four categories (Institute for Tourism of the Republic of Croatia, 2015): occasional cycling tourists, Cyclists for short distances, Long-distance cyclists, and Sports cyclists.

This category does not include the so-called commuters, people who ride a bicycle in urban areas using it as a means of transport, most often to work, since they do not leave their place of residence. According to the Institute for Tourism of the Republic of Croatia (2015), cycling tourism differs according to the length of the vacation: (i) One-day cycling tourism – the most common form of cycling tourism, characteristic of domestic tourists, i.e. day travellers; (ii) Holiday cycling tourism – a form of cycling tourism in which cycling is one of the activities of tourists during their holidays; (iii) Active cycling tourism – cycling is the main motive for travel.

Cycling tourism is also divided according to the following niches, i.e. surfaces and methods of cycling (CBI, 2019):

1. Road cycling – usually, it is practised by people between ages 18 and 49, and these rides develop higher speeds. Those cyclists can be categorised as athletes,
2. MTB cycling – practised by people who like to ride off-road, on unpaved roads, and most often in the hills and forests. Within this group, there are numerous subgroups, and their rides last several hours a day instead of a full day,
3. Family cycling – is for people who spend their holidays cycling, often with children. Most often, they cycle between one and several days,
4. Touring cycling – represents the largest number of bicycle trips. It is used by people who like cycling as a hobby and often combine it with other tourist activities such as festivals, wine tours, etc.

Cyclists also differ according to how they travel and cycle. Some travel from place to place on a specific route, like EuroVelo. EuroVelo represents a European network of cycling routes. It is a project by the ECF—European Cyclists' Federation with national and regional partners. Its main goal is to connect existing and planned national and regional cycling routes into a single European network. There are currently 17 routes, with new ones planned to be included.

There are four EuroVelo routes in Croatia:

- Number 6 – Atlantic – Black Sea (Danube route),
- Number 8 – Mediterranean route (Adriatic route),

- Number 9 – Baltic – Adriatic Sea,
- Number 13 – Iron Curtain Route (Drava Route).

Also, there are numerous international and national cycling routes outside of the EuroVelo routes. Some of them are the Sava route, the Drava route, the Mura route and the Parenzana. Some cycling tourists do not travel on EuroVelo routes but visit various destinations and explore them by bicycle.

The Netherlands and Denmark are the top countries in terms of popularity and cycling culture. People use bicycles daily in these countries. According to the CBI report, nine out of ten Danes own a bicycle, while four out of ten own a car. Rides in these countries are mostly within urban centres.

However, some destinations develop cycling tourism outside of cities and urban areas, such as Spain (Mallorca, Golden Coast), France (Provence, Champagne, Normandy, Alps), Italy (Tuscany, Sardinia, Alps), Austria (Danube region, Alps), and Slovenia. Recently, countries like Croatia, Cyprus, and Malta have also been working on the promotion and development of cycling tourism.

It is estimated that there are more than 60 million cycling tourists (Institute for Tourism of the Republic of Croatia, 2015) in the European Union, with the important point that cycling tourists spend more than average tourists. For example, in France, the average consumption of cycling tourists is 20% higher than the consumption of mass tourists.

Cycling tourism in Croatia

Sustainable tourism is becoming an important segment in the development of tourism in the Republic of Croatia in general, and the latest document shows this: Sustainable Tourism Development Strategy until 2030. The document indicates that economic and social development in balance with nature will create opportunities for current and future generations, with people at the centre of all investments according to the following envisioned directions for development (Croatian Parliament, 2023): sustainable economy and society, strengthening resistance to crises, green and digital transition and balanced regional development.

Policies aimed at achieving four strategic goals will contribute to developing a sustainable society. Even within the established strategic goal, 1. "Competitive and innovative economy," priority area 4. is the development of sustainable, innovative, and resilient tourism. This clearly shows that innovations and innovative approaches will be encouraged, especially if they target digital and green products and projects. This document also points to the increased development potential of cycling tourism, which is one of the most significant selective forms of tourism.

In 2017, the Ministry of Tourism of the Republic of Croatia started co-financing the development of cycling tourism for counties in Continental Croatia. The tender co-financed the creation of Operational Plans, cycling routes, standards, signalling, and training for cycling tourist guides. The last tender was announced in 2021 and helped develop cycling tourism in Continental Croatia.

Along with the development of active tourism, there are also innovative e-tools used by active people that serve as information, entertainment and education resources. Innovation e-tools ease the exploration of destinations, and with the development of technology, an even greater number of innovative e-tools will appear in the travel and tourism sector.

In addition to the previously listed EuroVelo routes and international cycling routes, destinations have begun developing cycling tourism projects, some of which have grown into products that attract numerous cycling tourists throughout the year.

Istria was among the first ones to make the complete cycling tourism development strategy with the brand Istria Bike. Initial goals, activities and work included complete standardisation, visuals, markings and trail tracing. After Istria Bike's success, they scaled the product to the entire outdoor segment with Istria Outdoor. Soon after, other products and concepts for cycling tourism started to develop, and the following are only some which are standardised and have visuals and the offers they include.

- Dalmatia Bike – developed by Tourist Board Split-Dalmatia County. The website contains all relevant information for any visitor who wants to explore this area on a bicycle,
- Pag Outdoor – an active tourism product developed by the five tourist boards of the island of Pag with the goal of branding the island of Pag as an outdoor destination. This product connects four outdoor activities (bike, trail, climbing, kayaking),
The Pag Outdoor currently has a website where all relevant information about the routes, including GPX formats, rental options, guides, events and other tourist-important information,
- Međimurje bike – a cycling tourism product that promotes Međimurje as a cycling tourism destination and is owned by the Tourist Board of Međimurje County. It has a website with all relevant data, routes including GPX records, contacts, bike&bed accommodation,
- Gorski Kotar Bike – a cycling tourism product launched by the Kvarner County Tourist Board for the whole region of Gorski Kotar. Like the previous products, they have a website that contains all the relevant information for every visitor on a bicycle,
- Slavonia Bike – a cycling tourism product of Brod-Posavina County that has both a mobile application and a website and represents a concept of thirty-one routes in Brod-Posavina County,
- Zagorje Bike – a complete cycling tourism concept and product that promotes Zagorje as a cycling tourism destination.

Some counties have mapped cycling routes, well-developed paths, educated cycling guides, and a larger number of cyclists, but they do not have any standardisation. Some of them are Pozega-Slavonia, Virovitica-Podravina, Karlovac County and the island of Krk. With the development of technology, the possibilities for planning and researching destinations are now easier for travellers. In the outdoor segment, well-known applications such as Strava and Garmin are available. Some more innovative e-tools and applications are popular in other parts of Europe, such as Komoot and Bikemap.

Strava is a popular app for those who are passionate about exercise and an active lifestyle. In the last few years, the number of activities in other sports, such as swimming, surfing, hiking and exercising in the gym, has also increased. The application records a large amount of statistical data that the user can use for exercise analysis. Another popular app for athletes is Garmin. It has features similar to those of Strava, and both concepts are primarily aimed at amateur athletes.

A popular application for cycling tourism in some European countries is Komoot. It is primarily used for planning routes, whether for bicycling, hiking, or walking. Other users' routes can be seen, as can important tourist information regarding accommodation, restaurants, campsites, beaches, etc.

Bikemap is an application primarily for cycling tourism. It shows various routes with a large amount of necessary information, and people can record and enter their routes. Many such products enable the download of routes in the so-called GPX format, which can be loaded through numerous applications and thus enable tourists to navigate and find their way around easily. New, innovative e-tools that promote cycling tourism destinations are also being developed, like the concept and cycling tourism product Bikademy, which rewards its users for cycling.

Bikademy is intended for all lovers of cycling and those who love to explore natural and cultural heritage by bike. It is made for both the local community and tourists in the destination. The Bikademy app is free for all users. It is designed as a virtual academy where there are Studies representing regions or cities (Istria, Zagreb, Rab, Šibenik, Novalja, Slavonian counties, etc.). Each Study consists of Exams (locations of natural and cultural heritage).

Cyclists need to choose their Study and cycle to all of the predefined Exams in that Study. Usually, there are around 7 Exams per Study with not only well-known locations but also those off-the-beaten-path. After they use an app to check in on each exam, they get a cycling reward. In this way, Bikademy becomes an added value in the cycling tourism offer of the destination and for all stakeholders that can use it as part of their offer. Bikademy creates a complete marketing mix for new Studies that promotes not only the destination but also the bicycle as a desirable means of transportation, a green way of living, preserving the environment, and natural and cultural heritage.

Table 1 presents a SWOT analysis of Continental Croatia. The strengths include attractive areas, diverse natural resources, nature preservation, parks, rich cultural and historical heritage, low-traffic roads, good transport connections, ideal relief for active tourism, a unique eno-gastronomic scene, hospitable population, availability of EU funds, and a high level of personal security. The weaknesses highlight poor cycling tourism infrastructure, depopulation, neglect of rural areas, weak bicycle transport options, inadequate traffic and tourism signalling, lack of professional knowledge and specialised services in cycling tourism, weak accommodation and hospitality offers, short average length of stay, insufficient promotion and recognition as a tourist destination, and underutilised natural and cultural resources for tourism.

Opportunities are identified in the region's status as an undiscovered destination, better promotion potential, cross-border cooperation, rural tourism growth, digitisation, government programs for tourism development, increased awareness of ecology and healthy lifestyles, destination route arrangements, funds for cycling tourism development, the national tourism strategy emphasising cycling tourism, raising professional knowledge, development of activities for cycling tourists, and shifting from seasonal to year-round tourism. Threats include environmental degradation from construction, lack of heritage protection funds, cyclist insecurity, limited infrastructure development and promotion funds, low tourism development awareness, stakeholder non-communication, insufficient local cooperation, and inadequate fiscal and regulatory policies for cycling tourism development.

Table 2 presents a SWOT analysis of Adriatic Croatia. The strengths include worldwide recognition of the region, attractive areas, coordinated efforts by tourist boards on cycling tourism development and promotion, numerous marked cycling routes, low-traffic roads outside the summer season, diverse natural resources, rich cultural and historical heritage, good transport connections, ideal relief for active tourism, a unique eno-gastronomic scene, availability of EU funds, proximity to airports, a well-developed tourist offer, and a high level of personal security.

The weaknesses highlight the absence of separate bicycle paths, lack of specialised cycling tourism facilities, lack of high-quality services in cycling tourism, excessive differentiation between coastal and hinterland development, neglect of rural areas, weak bicycle transport options by bus and train, weak accommodation and catering offers in the interior, seasonality of tourist activities, and weak inter-island connectivity.

Opportunities include good transport connections, ideal relief for active tourism, a unique eno-gastronomic scene, availability of EU funds, proximity to airports, a well-developed tourist offer, and a high level of personal security.

Threats involve environmental degradation from construction, degradation of tourist resources due to overuse, spontaneous tourism development, lack of funds for cultural and natural heritage protection, cyclist insecurity on motorised vehicle roads, poor traffic culture, insufficient funds for transport infrastructure, difficult development of cycling tourism infrastructure due to overbuilding, insufficient cooperation among local communities and counties, and inadequate fiscal and regulatory policies for cycling tourism development.

Table 1

SWOT analysis of Continental Croatia

Strengths	Weaknesses
<ul style="list-style-type: none"> • attractive areas • diversity of natural resources • preservation of nature • nature parks • rich cultural and historical heritage 	<ul style="list-style-type: none"> • poor cycling tourism infrastructure • depopulation • neglect of rural areas • weak possibilities of transporting bicycles by bus and train

<ul style="list-style-type: none"> • a large number of low-traffic roads • good transport connections • ideal relief for the development of active tourism • autochthonous eno-gastronomic scene • hospitality of the population • availability of EU funds • high level of personal security 	<ul style="list-style-type: none"> • weak traffic and cycling tourism signalling • lack of professional knowledge • lack of specialised services in cycling tourism • weak accommodation and hospitality offer • short average length of stay • insufficient promotion and recognition of the continental part of Croatia as a tourist destination • insufficiently used natural and cultural resources for tourism purposes
Opportunities	Threats
<ul style="list-style-type: none"> • the status of the continental part of Croatia as an undiscovered destination • the region's potential through better promotion • cross-border cooperation with neighbouring countries • the growth trend of rural tourism • digitisation • programs of the Government of the Republic of Croatia for the development of continental tourism • raising awareness about ecology and a healthy lifestyle • arrangement of destination routes • the possibility of using funds for the purpose of developing cycling tourism • the tourism strategy of the Republic of Croatia indicates that cycling tourism is an extremely important segment • raising the level of professional knowledge in the field of cycling tourism • development of the offer of accompanying content and activities for cycling tourists • orientation from seasonal to year-round tourism 	<ul style="list-style-type: none"> • degradation of the natural environment through construction • lack of funds for the protection of cultural and natural heritage • the insecurity of cyclists on roads • limited funds for infrastructure development and promotion • low level of awareness in the development of tourism • non-communication of stakeholders • insufficient cooperation between local communities and counties • inadequacy of fiscal and regulatory policy regarding the requirements of cycling tourism development

Source: Author's illustration.

Table 2

SWOT analysis of Adriatic Croatia

Strengths	Weaknesses
<ul style="list-style-type: none"> • recognition of the region worldwide • attractive areas • coordinated work of tourist boards on the development and promotion of cycling 	<ul style="list-style-type: none"> • the absence of separate bicycle paths • lack of specialised cycling tourism facilities (bike parks, etc.) • lack of high-quality services in cycling

<p>tourism</p> <ul style="list-style-type: none"> • a large number of marked cycling routes • a large number of low-traffic roads outside the summer season • diversity of natural resources • rich cultural and historical heritage • good transport connections • ideal relief for the development of active tourism • autochthonous eno-gastronomic scene • availability of EU funds • proximity to airports • a high degree of development of the tourist offer • high level of personal security 	<p>tourism</p> <ul style="list-style-type: none"> • excessive differentiation between the development of the coast and the hinterland • neglect of rural areas • weak possibilities of transporting bicycles by bus and train • weak accommodation and catering offer in the interior • seasonality of tourist activities and activities • weak inter-island connectivity
Opportunities	Threats
<ul style="list-style-type: none"> • good transport connections • ideal relief for the development of active tourism • autochthonous eno-gastronomic scene • availability of EU funds • proximity to airports • a high degree of development of the tourist offer • high level of personal security 	<ul style="list-style-type: none"> • degradation of the natural environment through construction • degradation of tourist resources due to excessive use • spontaneous development of tourism in general • lack of funds for the protection of cultural and natural heritage • insecurity of cyclists on roads for motorised vehicles • traffic culture • insufficient funds for financing transport infrastructure • difficult development of cycling tourism infrastructure due to overbuilding • insufficient cooperation between local communities and counties • inadequacy of fiscal and regulatory policy regarding the requirements of cycling tourism development

Source: Author's illustration.

Methodology

This paper examines the use of currently available digital tools and makes recommendations on how they can increase the visibility of cycling tourism destinations in the Adriatic and Continental Croatia.

In this paper, the author(s) put forward two research propositions (RP):

- RP1: The local community and relevant stakeholders are not aware of the importance (impact) of e-innovation in cycle tourism.
- RP2: There are significant differences in the level of development of cycling tourism in the Adriatic and Continental Croatia.

The survey was conducted online from January 24th to February 15th, 2023. A total of 117 respondents participated in the research. Since the questionnaire was available online, respondents were randomly selected and volunteered to fill it out.

Through this research, the author(s) tried to examine how and which implementation of innovative e-tools affects the sustainable development of cycling tourism destinations in Croatia. The questionnaire consisted of 29 questions, of which 28 were closed type and 1 open type (question 12), where respondents had to state their answers.

Out of the 28 closed questions, 4 were two-fold (questions 21, 22, 24, and 25), in which examiners were offered a choice between two options—yes and no—regarding gender—male and female.

The questionnaire also used a measurement scale (Likert's scale) for questions 10, 11, 13, 14, 15, 16, 17, 27, 28 and 29. Table 3 contains data on the socio-demographic characteristics of the respondents and their knowledge of cycle tourism.

The table summarises the distribution of respondents by gender, age, county, and familiarity with projects that promote cycling tourism and urban mobility.

Regarding gender, 42.4% of respondents are male, and 57.6% are female, totalling 118 respondents. In terms of age, 10.2% of respondents are aged 21-30, 33.1% are aged 31-40, 37.3% are aged 41-50, 14.4% are aged 51-60, and 5.1% are over 60.

Most of the respondents are from Brod-Posavina (30.5%), followed by Osijek-Baranya (18.6%) and the City of Zagreb (11.0%). Other counties represented include Istria (13.6%), Kvarner (5.9%), Vukovar-Srijem (5.9%), and several counties each contributing 2.5% of respondents, such as Zagreb County, Zadar, Dubrovnik-Neretva, and Koprivnica-Križevci. Additionally, Požega-Slavonia, Split-Dalmatia, Lika-Senj, Bjelovar-Bilogora, and Karlovac each have 0.8% of respondents.

Regarding familiarity with projects promoting cycling tourism and urban mobility, 66.1% of respondents are familiar with such initiatives, while 33.9% are not familiar.

Table 3

Respondents by gender, age, county and familiarity with projects that promote cycling tourism and urban mobility

Gender	n	%	County	%	n
Male	50	42.4	Osijek-Baranya	22	18.6
Female	68	57.6	Brod-Posavina	36	30.5
Total	118	100.0	Istria	16	13.6
			Zagreb county	3	2.5

Age	n	%	City of Zagreb	13	11.0
21 – 30	12	10.2	Pozega-Slavonia	1	.8
31 – 40	39	33.1	Kvarner	7	5.9
41 – 50	44	37.3	Split-Dalmatia	1	.8
51 – 60	17	14.4	Vukovar-Srijem	7	5.9
60 >	6	5.1	Zadar	3	2.5
Total	118	100.0	Dubrovnik-Neretva	3	2.5
			Koprivnica-Križevci	3	2.5
Familiarity with projects/initiatives/products	n	%	Lika-Senj	1	.8
Yes	78	66.1	Bjelovar-Bilogora	1	.8
No	40	33.9	Karlovac	1	.8
Total	118	100.0	Total	118	100.0

Source: Author's calculation,

Results

According to the motives for visiting destinations (Table 4), 61.5% of respondents choose nature as the main reason for visiting destinations, 58.1% choose the sea, 47.9% choose sport and recreation (active vacation), 41.9% choose a business, 38.5% choose a city break, and 36.8% choose culture. These results indicate the diverse interests of visitors, with a strong emphasis on natural and recreational attractions.

Table 5 presents the attitudes of respondents about the impact of innovative solutions on the development and sustainability of the tourism destination. According to survey results, only 2.5% of respondents completely disagree that innovative solutions impact the development and sustainability of tourism destinations, 2.5% disagree, 11.9% neither agree nor disagree, and 23.7% agree. In contrast, the largest number of respondents, 59.3%, strongly agree. The results suggest a broad recognition of the importance of innovation in enhancing tourism experiences and ensuring long-term sustainability. This consensus is likely the consequence of the growing awareness of how technological advancements and innovative practices can address contemporary challenges in the tourism sector.

Table 4

Reasons for visiting the destination

Reasons for visiting the destination	Sea	Nature	City break	Sport and recreation (active vacation)	Business	Culture
Culture						36.8
Business					41.9	

Sport and recreation (active vacation)		47.9
City Break		38.5
Nature	61.5	
Sea	58.1	

Source: Author's calculation.

Table 5

Innovative solutions and impact on the development and sustainability of the tourism destination

Level of agreement	n	%	Cumulative %
Strongly disagree	3	2.5	2.5
Disagree	3	2.5	5.1
Neither agree nor disagree	14	11.9	16.9
Agree	28	23.7	40.7
Strongly agree	70	59.3	100.0
Total	118	100.0	

Source: Author's calculation.

Table 6 compares the level of awareness of the local community and relevant stakeholders about the importance of innovative e-tools and innovations in the tourism development of cycling destinations for Adriatic and Continental Croatia.

According to the level of awareness of the local community and relevant stakeholders about the importance of innovative e-tools in the tourism development of destinations in Adriatic Croatia, 11.9% of respondents consider the level of the local community and key stakeholders bad, 25.4% consider it satisfactory, 43.2% consider it good, 11.9% consider it very good, and 7.6% of respondents consider it excellent. For Continental Croatia, the data shows that 15.3% of respondents rate their agreement as bad, 34.7% consider it satisfactory, 39.8% consider it good, 7.6% consider it very good, and 2.5% consider it excellent. These results indicate that while there is a general recognition of the importance of innovative e-tools among stakeholders in both regions, the perceived level of awareness and engagement is somewhat higher in Adriatic Croatia compared to Continental Croatia, highlighting a potential area for development and improvement in the latter.

Table 6

The level of awareness of the local community and relevant stakeholders of the importance of innovative e-tools in the tourism development of cycling destinations for Adriatic and Continental Croatia

Region	Bad	Satisfactory	Good	Very Good	Excellent
Adriatic	5	18	38	32	7

Continental	12	28	31	23	7
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Source: Author's calculation.

According to mobile app selection, while cycling (Table 7), 33.1% of respondents use the Strava app, 55.9% use Google Maps, 25.4% use Garmin, 18.6% do not use any mobile app, and 3.4% use Komoot. In comparison, 0.8% use cartographic apps with GPX, Bryton, Polar, and Bikademy. These results indicate a strong preference for mainstream and widely recognised apps like Google Maps and Strava, which offer user-friendly interfaces and comprehensive features for navigation and tracking. The relatively lower usage of specialised apps such as Komoot and cartographic tools suggests that while some cyclists seek advanced functionalities, the majority prefer the convenience and familiarity of more popular options. The significant percentage of respondents who do not use any app also highlights a potential market for increasing awareness and adoption of cycling-specific mobile applications.

Table 7

App selection while cycling

App	Strava	Google maps	Google maps	Garmin	Do not use any	Komoot	Bryton	Pollar	Bikadem y
Strava	33.1								
Google maps		55.9							
Garmin			25.4						
Do not use any				18.6					
Komoot					3.4				
Cartographic app with GPS						0.8			
Bryton							0.8		
Polar								0.8	
Bikademy									0.8

Source: Author's illustration.

Table 8

Level of cycling tourism development in Croatia by regions

Level of cycling tourism development	Low	Satisfactory	Good	Very Good	Excellent
Istria	4	16	29	45	24
Eastern Croatia	29	36	37	14	2
Central	20	40	45	10	3
Northwestern	11	35	23	23	5

Zagreb and surroundings	11	29	46	25	7
Lika and Gorski kotar	37	38	31	9	3
Dalmatia	26	32	37	19	4
Kvarner	24	38	30	23	3

Source: Author's illustration.

According to the level of cycling tourism development by region (Table 8), it is evident that Istria is the leading region in cycling tourism. In addition to Istria, the research indicates that Zagreb and its surroundings, as well as Northwestern Croatia and Kvarner, also have a high level of development. These findings suggest that these regions have invested significantly in cycling infrastructure, promotion, and services, making them attractive destinations for cycling enthusiasts. The prominence of Istria could be attributed to its established reputation as a tourist destination, diverse landscapes, and dedicated cycling routes. Similarly, Zagreb and its surroundings, Northwestern Croatia, and Kvarner benefit from good transport connections, rich cultural heritage, and coordinated efforts to enhance their cycling tourism offerings.

Discussion

The level of awareness of the local community and relevant stakeholders about the importance of innovative e-tools in tourism development of cycling tourism in Adriatic Croatia, according to the conducted research, is that 43.2% of respondents think that it is good, 11.9% think that it is very good. In comparison, 7.6% think that it is excellent, which leads to the conclusion that the local community and key stakeholders in the tourism development of the cycling destination Adriatic Croatia have significant space for progress in the form of self-awareness, learning through examples of good practice, investing additional financial resources in innovation e-tools, all with the goal of further development and sustainability of this selective form of tourism.

Also, if we take into account the results of the conducted research, the situation in Continental Croatia is less favourable than the situation in Adriatic Croatia. Namely, 34.7% of respondents believe that the level of awareness of the local community and key stakeholders about the importance of innovative e-tools in the tourism development of the destination is satisfactory, and 7.6% believe that it is very good. In comparison, 2.5% of them believe that it is excellent. The aforementioned confirmed RP1 that the awareness of the local community and relevant stakeholders of the importance (impact) of e-innovation in cycle tourism is low.

According to the research results and Table 8, the level of cycling tourism development in Croatia is determined by region, and Istria is the leading region in cycling tourism. After Istria, Zagreb and its surroundings have the highest level of development, as do Northwestern Croatia and Kvarner. The aforementioned confirmed RP2 that there are

significant differences in the level of development of cycling tourism in the Adriatic and Continental Croatia.

Conclusion

Survey results indicated that the level of awareness of the local community about the importance and impact of e-innovations in Adriatic Croatia is somewhat greater than in Continental Croatia. As the best example of the development of cycling tourism, Istria is by far the most prominent. Also, it can be concluded that innovative e-tools significantly affect the development and sustainability of a tourism destination and that they can significantly help in the development of less-developed areas. In this case, it refers to the Continental Croatia.

Continental Croatia has all the preconditions to become an important cycling tourism destination through the development of cycling tourism in general and the development of connected innovation e-tools. This is supported by increased communication between stakeholders on the continent. For example, the cluster of five tourism communities of Slavonia and Baranya has just completed the strategy for the development of active tourism - Slavonia Outdoor, which also includes the development of digital products.

These guidelines can serve as a guide for the faster development of cycling tourism not only in the continental part of Croatia but also in the development of active tourism throughout the whole of Croatia.

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