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Use and Promotion of Bicycles for Sustainable Urban Mobility: The Case of Bizkaia

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Abstract: In today's global scenario, any aspiration for sustainable development centers around cities. Decades of a hegemonic motor vehicle culture have led to unprecedented levels of noise and environmental pollution, urban congestion, sedentary lifestyles, and increased vulnerability to the effects of climate change. Mobility, thus, becomes a cornerstone in transitioning toward more sustainable urban models, where active mobility is unquestionable. More and more cities are focusing on promoting urban cycling, not only as a leisure practice, but also as an alternative mode of transport. This article delves into the progress and current situation of cycling in Bizkaia, a city in the Basque Country in northern Spain. Based on the insights from and knowledge of seventeen experts, it explores the main challenges and strategic actions necessary to promote its expansion as a sustainable urban transport mode. The study employs a qualitative methodology, with results affirming the importance of some of the "key factors" identified in the literature as essential for any transition toward sustainable urban mobility through cycling. Among these key factors, sports leisure is highlighted due to its central role as a facilitator in the acquisition and consolidation of these new mobility habits. The study concludes by advancing five fundamental premises, the main contribution of this work, that encapsulate essential knowledge, without which any strategy to promote cycling as an alternative mode of sustainable urban mobility may falter.

Keywords: cities; bicycle; uses and promotion; leisure; sustainable urban mobility

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1. Introduction

The last three decades and the growing challenges contemporary societies face have provided the necessary context to understand the importance of sustainability as the central axis of our development model. Not without paradoxes and difficulties, the challenge of sustainability has been gaining credibility and acceptance in international and local agendas, while the complexity and transversality of the concept and its multiple dimensions (social, economic, cultural), beyond the environmental one, have become evident [1–3].

Sustainability has also meant a turning point in the way of doing politics, especially urban politics, and has inspired countless theories and initiatives worldwide, aimed at promoting this new paradigm of sustainable development [4–6]. Any aspiration for sustainable development finds in cities the epicenter of its work. Thus, sustainable urban development seeks to advance toward new models of greener, wiser, healthier, more accessible, and cohesive cities [3,7,8], where the challenge of mobility urgently demands alternative solutions. Decades of a hegemonic motor vehicle culture have led to unprecedented levels of noise and environmental pollution, urban congestion, sedentary lifestyles, and states of

increasing vulnerability to the effects of climate change [9,10]. Therefore, more and more cities are advocating innovative urban planning and transportation strategies aimed at reducing the presence of motor vehicles, reclaiming public space for social life, as well as lifestyles and forms of active mobility that include walking, running, cycling, and other non-motorized vehicles [11–14].

This article explores, by means of a qualitative methodological design and based on the opinions and knowledge of the seventeen experts interviewed, the evolution and state of the bicycle in the Historical Territory of Bizkaia (Basque Country, Spain), as well as the main challenges and strategic actions for its expansion as an alternative mode of sustainable mobility. For this purpose, the following specific objectives are undertaken:

- To know the habits of use of the bicycle in Bizkaia, as an alternative mode of urban travel.
- To identify the main barriers that may prevent or limit the use of bicycles and the conditions under which citizens would be willing to incorporate this habit into their lifestyle.
- To outline the main challenges and strategic actions necessary to achieve the widespread use of bicycles in Bizkaia as a sustainable mode of urban mobility.

1.1. Sustainable Urban Mobility (SUM): An Unavoidable Challenge in Contemporary Cities

Sustainable urban mobility is a complex and inclusive concept involving not only transportation but also health, education, culture, the economy, the environment, and urban issues and governance models [4,5,15]. An effective sustainable urban mobility policy will aim for a transportation system that is safe, accessible, and low-emission, while also being economically viable, with minimal energy dependence, and capable of structuring the territory and fostering citizen participation [15,16].

For some authors, mobility is not an end in itself; its ultimate purpose lies in the accessibility it provides. That is, the assurance of a complex system of movement patterns that cities and their inhabitants need to meet their daily needs and activities [17,18]. In this sense, such accessibility can be guaranteed both through mobility and transportation, as well as by promoting the proximity of urban spaces; in other words, bringing services closer to people (decentralization, urban planning, proper territorial organization…) [6,19]. This proximity, in contrast to city models that favor long distances, can prevent unnecessary travel while encouraging multimodal forms of transportation, combining various means to enhance cities' environmental and urban quality. This is undoubtedly the foundation that inspires new city models, such as the 30 min city or superblocks, and their implementation in various parts of the world [9,20,21]. In European cities, more than 30% of urban trips are less than three kilometers, confirming that both bicycles and walking can replace a significant portion of motorized trips [18,22]. The emergence of electric bicycles opens up new opportunities for cycling mobility, making urban trips involving slightly longer distances than these three kilometers feasible [23,24]. However, it is striking that, although such bicycles add to the EU-led push for electric transport, they are far from receiving the same support as electric cars [25]. The old paradigm of the functional segregation of modern urbanism, which in its application to cities consolidated models where residential areas are separated from productive, service, cultural, or leisure areas, has become obsolete. Contemporary cities require measures that overturn the focus on long distances and recognize proximity as one of the most effective strategies for sustainable urban mobility, by promoting active forms of mobility, including walking and cycling. It can be said, then, that active mobility has become an exceptional ally of sustainable urban mobility due to its potential, which is entirely in line with the restructuring measures any city must undertake to advance toward sustainable development.

1.2. Contribution of the Bicycle to Sustainable Urban Mobility (SUM)

As already seen, sustainable mobility is one of the most complex challenges for today's societies, given that connectivity and mobility are major imperatives in a globalized and interconnected world. In the European context, the European Commission's Sustainable and Smart Mobility Strategy and the European Green Deal [26] emphasize the urgency of moving toward "an efficient and interconnected multimodal transport system, both for passengers and freight, that promotes cleaner and more active mobility in greener cities" [26]. This vision involves combining different modes of transportation (comfort, speed, cost, reliability, or predictability) to provide more efficient and sustainable transport solutions for citizens [26]. In Spain, aligning with this European scenario, the Ministry of Transport, Mobility, and Urban Agenda has designed the Safe, Sustainable, and Connected Mobility Strategy 2030 [27] to facilitate a proper transition toward safer, more sustainable, and connected mobility. Additionally, the State Strategy for the Bicycle (EEB) [28] represents a strong commitment to the use of bicycles as an alternative urban mobility mode, perfectly aligned with the challenge of sustainability and various urban agendas and mobility strategies at different levels (Spanish, European, etc.). This is undoubtedly one of the reasons for its current rise, but the numerous benefits of using the bicycle as an urban transportation mode cannot be overlooked. These benefits include personal advantages—such as its low cost, comfort, speed in travel, and improvement in physical condition—as well as social, economic, and urban benefits as the bicycle does not pollute, is silent, quick for short and medium distances, economical, easy to use, and a source of savings and environmental health improvement by reducing traffic congestion and CO_2 emissions [5,29]. Additionally, it enhances the urban landscape and quality of public spaces, strengthens the social fabric, and generally improves well-being and quality of life [4,9,13].

More and more cities worldwide are focusing their efforts on promoting the bicycle as an alternative mode of transport [30–32]. Paris, Velo Malopolska, Bogotá, Antwerp, Oslo, Utrecht, and Copenhagen stand out for their continued promotion of urban cycling and their ongoing initiatives to advance sustainable urban mobility [21,33]. In Spain, Vitoria-Gasteiz, Seville, Valencia, Logroño, and Barcelona emerge as exemplary models of this commitment to cycling, achieving a high level of social adoption of this mode in the urban mobility habits of their residents [33]. The case of Barcelona is well-known because its support for cycling is part of a simultaneous commitment to proximity through its superblock model; an innovative urban planning strategy being implemented in other cities (Vitoria-Gasteiz, New York, Boston, and Montevideo). This model aims to reclaim public space, reduce motorized transport, promote the renaturalization of spaces, and encourage active mobility [9]. Additionally, many cities with less tradition and support for cycling are now looking to explore their potential to become bike-friendly cities. This is the case of The PRESTO Project [34], a study conducted in Portugal, aimed at measuring this conversion potential in four municipalities (Porto, Braga, Guimarães, and Matosinhos) with minimal preliminary conditions and a residual cycling modal share between 0.1% and 0.3% [31].

The PASTA Project, "Physical Activity Through Transport Approaches" [35], conducted a longitudinal study to compare the behavior patterns, health, and physical activity of over 10,000 residents in seven European cities based on whether or not they were bicycle users. One of the most significant findings was that all bicycle users made trips with an average distance and duration shorter than those of non-users, a fact that could support the hypothesis that non-bicycle users make longer trips, leading to greater dependence on private cars or public transport. However, this study also demonstrated that 43% of these trips covered distances of 5 km or less, which could be undertaken by bicycle.

It is well known, however, that any policy promoting the use of bicycles as a means of urban mobility must address various barriers that significantly hinder the expansion of this habit among citizens. These barriers are structural as well as subjective, social, or cultural [33,36–38], and they influence people's decisions about their mobility patterns, explaining the different forms of resistance to urban cycling.

2. Materials and Method

This study is part of a broader investigation conducted in Bizkaia, one of the three Historical Territories that make up the Autonomous Community of Euskadi, in northern Spain. This research was commissioned by the Provincial Council of Bizkaia, the governing body in this context, with mobility and territorial planning competencies. The overall research was based on a mixed methodology (surveys and in-depth semi-structured interviews were both used) aimed at studying the social penetration of bicycles in Bizkaia, the current situation, and the main challenges for their implementation in the Territory. Due to length limitations, this article focuses on the results obtained in the qualitative design phase, which sought to understand, from experts' perspectives, the evolution and current state of urban cycling in the Historical Territory of Bizkaia and the main challenges for its expansion as an alternative mode of sustainable mobility.

Given the importance of the geographical context for the understanding of the object of study, the following is essential information about Bizkaia, its location, climate, and orography, as well as its current situation in terms of infrastructure and other essential resources for the use of bicycles as a sustainable means of transport.

2.1. Bizkaia: Context and Progress in Bicycle Promotion

Bizkaia is one of the three Historical Territories that make up the Autonomous Community of the Basque Country, along with Araba and Gipuzkoa. Located in the north of the Iberian Peninsula, Bizkaia is characterized by high rainfall and a mountainous terrain, with elevations over 1000 m close to the sea, resulting in steep gradients over short distances. The climate is Atlantic, very rainy, and with moderate temperatures.

Bizkaia has 112 municipalities organized into seven regions [39]. Although it is the most densely populated Historical Territory of the Basque Country (516.5 inhabitants/km^2), its population is unevenly distributed. Its capital and most populous city is Bilbao. Most live in municipalities in the Bilbao metropolitan area, the sixth largest in Spain. These population density differences, along with a complex geography and climate, provide an initial insight into the nature of the Territory.

Regarding cycling mobility, Bizkaia has an extensive network of cycling routes that cover a large part of the Territory (Figure 1). In the early 2000s, Bizkaia had just over 50 km of cycling routes implemented throughout the Territory; these were experimental initiatives not integrated into any urban plan or cycling network. By the late 2022, there were over 439 km of adapted cycling routes, of which 338.5 km are clearly separated from car lanes. Additionally, 34 km of new routes were under construction, considered within a planning framework primarily at the municipal level, aiming for approximately 1042 km [40] (https://www.bizkaia.eus/es/bicicletas/cicloturismo, accessed on 4 December 2024).

The post-COVID-19 years have enabled Bizkaia to make various advances in promoting the bicycle as a means of urban transportation. Among these achievements, strategic initiatives stand out, such as the White Paper on Bicycle Mobility [41], which reflects on the role of the bicycle in Bizkaia and establishes key strategies for its promotion, and the Territorial Sectorial Plan for Cycling Routes in Bizkaia (PTSVCB 2023–2035) [42], a territorial planning instrument that details the Territory's cycling network, priority mobility objectives, and its connectivity with neighboring regions, alongside their cycling transport

planning. Its importance lies in its prevalence over urban planning determinations, making it essential for enabling cycling infrastructure in Bizkaia. Following the approval of the PTSVCB in 2022, the Provincial Council of Bizkaia has launched various initiatives, such as secure bicycle parking stations (BiziPark), bicycle maintenance and cleaning points (Bizipuntos), and the newly launched electric bicycle lending service (BizkaiBizi), involving nine municipalities in Bizkaia where 60% of the Territory's population resides. This service, which represents a definitive boost to a more sustainable and healthy mobility system for Bizkaia, debuts with a total of 650 units distributed across 78 stations located in participating municipalities, allowing intermunicipal travel without needing to return the bicycle to its original location.

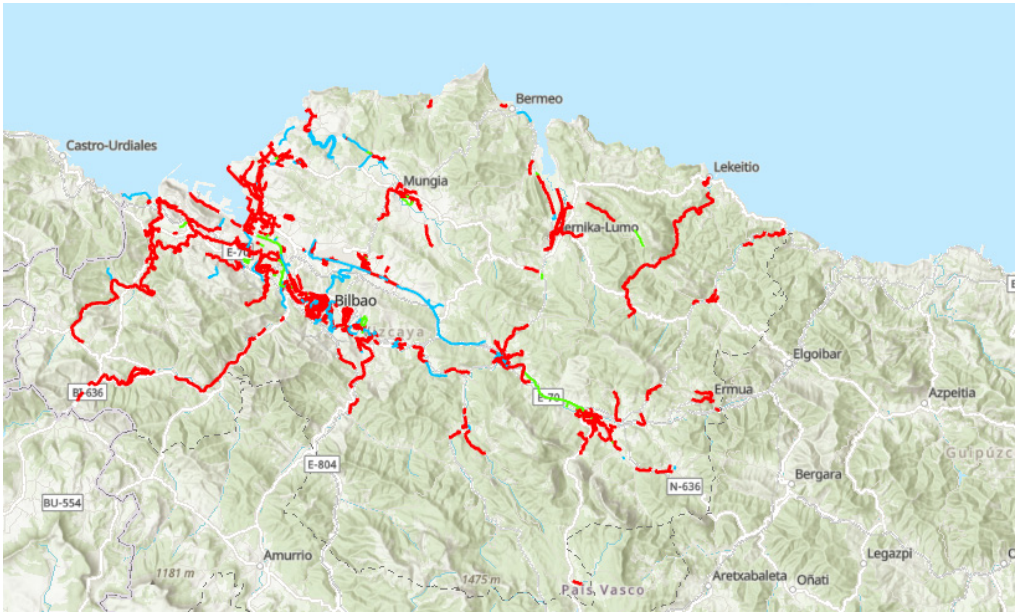

Figure 1. Bizkaia's cycling network (green: under construction; red: executed; blue: planned). Source: https://geo.bizkaia.eus/ (accessed on 4 December 2024).

According to data from the first Bizkaia bicycle barometer [43], 50% of Bizkaia citizens have their own bicycle and 38% are regular or occasional users of this mode of transport. The use of bicycles is linked, above all, to sports (49%) and health (44%) and, to a lesser extent, to mobility (36%) and the environment (31%). Six percent stated that they use this means of transport to go to work or to school. The average number of bicycles in Bizkaia households is 2.6, with mountain bikes (70%) being the most common. Electric bicycles are gaining ground, although only 6% of Bizkaia citizens say they own an electric bicycle. A total of 52% of regular users consider that their municipality is friendly/safe for cycling, with large differences in this perception also standing out by county. Among those who do not consider their municipality friendly/safe for cycling, the following reasons stand out: the lack of cycle paths or their poor design (73%), excessive traffic (51%), a municipality that is not adapted (41%), or the orography (37%), among others. Among the main difficulties for cycling in the city, 73% of the population has mentioned excessive motorized traffic, insufficient bicycle lanes, the risk of theft, and the insufficient number of bicycle parking spaces (Figure 2).

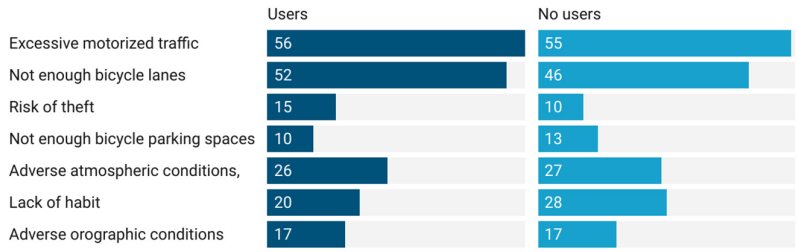

Figure 2. Difficulties of cycling in the city, by type of user (%) [20] (p. 9).

2.2. Instruments

The semi-structured in-depth interview script was prepared "ad hoc" for this study, following the review of other instruments measuring the same object of study, both in the Basque context [44,45] and internationally [46,47].

The content was organized into four thematic blocks: 1. Perception of the evolution and state of bicycle use habits as an alternative urban transport mode; 2. Barriers that may prevent or limit bicycle use and the conditions under which citizens would be willing to incorporate this habit into their lifestyle; 3. Conditions under which citizens would be willing to incorporate this habit into their lifestyle; 4. Main challenges that need to be addressed to generalize the use of bicycles as an urban mobility mode in Bizkaia, as well as the actions necessary to overcome these challenges.

2.3. Participants

The sample consisted of a total of seventeen key figures from the society of Bizkaia, experts in the challenges of sustainable urban development, alternative urban mobility, and the use of bicycles as an alternative mode of urban travel; fourteen of them were people of reference in Bizkaia society (institutions, companies, and third sector entities) and the remaining three were experts from academia and observatories. All of them were linked to different sectors (institutions, companies, and third sector entities) and dimensions of sustainability (environmental, economic, social, and cultural) (Table 1). This heterogeneous sample made it possible to deploy a multidimensional and multidisciplinary perspective of the object of study, without which it would not have been possible to adopt a sufficiently diverse, complex, holistic, and interconnected approach to the reality of cycling in Bizkaia. At the same time, the composition of the sample guaranteed the structural heterogeneity on which the reliability and validity of a qualitative study is based. Informed consent for participation was obtained from all the subjects involved in the study.

Table 1. Details of the sample of experts studied.

Type of Agent	Dimensions of Sustainable Development				Total	Gender		Total
	Environmental	Economic	Cultural	Social		Female	Male	
Institutions	1	1	1	1	4	1	3	4
Companies	1	2	1	1	5	2	3	5
Third sector	1	1	2	1	5	4	1	5
Experts (academy, observatory)	1	0	1	1	3	2	1	3
Total	4	4	5	4	17	9	8	17

2.4. Procedure

All interviews were conducted online between June and October 2021, with an average duration of approximately 60 min. The content was recorded, and the corresponding consent was obtained from the interviewee.

2.5. Data Analysis

The analysis of the collected information was organized around three stages. The first stage focused on the preparation of individual responses to the interviews. During this phase, each interview was transcribed, identifying key issues and critical topics brought up by each expert, as well as new emerging topics not initially considered in the interview script. Subsequently, a draft analysis text was written, reinterpreting the various contributions, supported by the interviewees' words. In the second stage, categories were identified, addressing both the questions the study sought to answer and the key issues detected previously, which are now associated with the main generated thematic categories. This stage involved identifying common and divergent positions and opinions regarding the discussed topics, as well as detecting particular issues or problems not mentioned by most interviewees but crucial for shedding light on the subject of the study. In the third stage, to gather feedback and approval from the interviewees, the review phase was carried out by sharing the individual texts and interpretations made by the research team with them. From this point, the final report was written, resulting from the work conducted in the previous stages [48,49].

3. Results

The interviews conducted allowed us to gather the know-how of seventeen individuals whose education, professional background, and expertise in urban cycling and sustainable mobility were essential for understanding the evolution and current status of the bicycle as a means of urban transportation in Bizkaia. These insights helped identify the barriers hindering its expansion and the conditions that, according to the consulted experts, the public demands for the practical use of bicycles. Additionally, the empirical study enabled us to outline the priority challenges and strategic actions needed to advance toward sustainable urban mobility through cycling in Bizkaia.

3.1. Evolution and Status of Bicycle Usage Habits in Bizkaia

There was a clear consensus regarding the evolution of bicycle usage habits as a means of urban transportation in Bizkaia. Most experts considered that there has been an increase in bicycle usage, with more people incorporating it into their daily commuting habits. There are more bicycles on the streets as well as more cycling infrastructure and available services (parking, public bicycle loan systems, etc.) across the municipalities of Bizkaia. Bilbao, the territory's capital, is repeatedly mentioned as a leading example in this regard due to various measures taken in favor of bicycles and the progress achieved. Initiatives like the Bilbon Bizi program, the public bicycle loan system, and the pioneering introduction of electric bicycles have enabled individuals with different profiles to use bicycles for urban commuting regularly.

Overall, there is a prevailing impression that the bicycle culture is taking root among the citizens of Bizkaia, for several reasons (each expert consulted is identified as E1, E2, etc., up to identifying all 17 individuals in the sample):

- First, because this sustainable mobility alternative aligns with and contributes to achieving increasingly appreciated post-materialistic values for contemporary citizens, such as living well, actively, and in good health.

"We are witnessing a time of changing values, where there is a commitment to living well and in good health. This culture resonates with the population and offers an advantage for bicycles, as it contributes to achieving these rising values." (E1)

- Second, the COVID-19 pandemic is seen as a turning point in the use of bicycles as a mode of transportation, transforming it into a resilient resource capable of meeting the safe mobility needs demanded during that period (avoiding mass gatherings, maintaining safe distance from others). The pandemic is, therefore, perceived as an opportunity for the expansion of bicycle use and sustainable urban mobility.
- Third, there is a clear alignment between the characteristics, opportunities, and advantages offered by bicycles and the strategic role of urban mobility in achieving the United Nations Sustainable Development Goals (SDGs) [2]. This mode of transportation, the bicycle, is considered one of the so-called 'lever policies' due to its cross-cutting ability to promote multiple SDGs simultaneously.
- Fourthly, there is a great fondness for cycling as a leisure sport in Bizkaia; therefore, there is already a lot of signage, the habit of maintaining safe distances, and respect for cyclists. All this is a great step forward.
- Furthermore, the climate emergency is also seen as an opportunity, especially because, at the European level, it has facilitated the necessary regulatory framework to require public administrations to adopt measures against motor vehicles (the pedestrianization of streets, the reduction of car presence in specific urban areas, urban pacification, etc.) that "perhaps would not have been adopted due to the dominant culture of motorized transportation." (E2).
- The impact of institutional efforts and administrations' commitment, especially the Provincial Council of Bizkaia, to promote cycling is emphasized in this growing expansion process. The increase in services, resources, and facilities provided by public institutions in general, and the municipalities of Bizkaia in particular, is evident throughout the Territory (the opening of new cycle lanes, traffic calming measures, plans for pedestrianizing public spaces, etc.) and has resulted in a growing demand, which, in turn, stimulates the continuous improvement of services. However, contrasting views suggest that, in terms of the Territory, the development does not match the significant efforts made by institutions. Nonetheless, most of those interviewed believe that, both institutionally and in terms of cycling in cities, we are currently in a particularly favorable moment for bicycles. A clear testament to this is that many political objectives influencing European funds include this vision of cycling mobility.

3.2. Barriers to the Use of Bicycles as a Means of Urban Mobility in Bizkaia

The main barriers mentioned are the orography and climate of Bizkaia, the governance model, and the state of the infrastructure (cycling network) (external or structural barriers); the absence of a bicycle culture as a means of urban transportation (social barrier); and the perception of insecurity, both road-wise and personal (subjective barriers). Below, each of the involved barriers is presented in more detail:

- The most highlighted external or structural barriers refer to the orographic and climatological characteristics of Bizkaia, as well as the existence of a complex urban fabric in many municipalities in Bizkaia, including Bilbao, which is excessively dense and concentrated. It is stated, however, that the climate and orography particularly affect the decision to start using the bicycle as a means of urban transportation, but not so much the decisions to continue or abandon this use. It is considered that, once the habit of using the bicycle is started and internalized, the effect of these barriers would not be as significant. It is also noted that electric bicycles can help mitigate barriers associated with the orography.

Some people point to the governance model that prevails regarding the promotion of bicycle use in Bizkaia as another structural barrier. Although there is an ongoing dialogue between the public administration and other stakeholders, the complexity of the challenge and the diversity of agents with competencies in this area (the Government, the Provincial Council of Bizkaia, municipalities, port, coast, etc.) demand forms of consensus and the activation of necessary mechanisms to advance in terms of action. These barriers hinder the uniformity and standardization of current regulations in different municipalities. Thus, "the corresponding ordinance in one municipality can be different from the one in the neighboring municipality" (E3).

The infrastructures, that is, the situation and characteristics of the available cycling networks, emerge as another important structural barrier. Despite the advances and plans already being carried out regarding bike lanes and their existing connections (for example, between Barakaldo and the right bank, the bike lane that connects Bilbao and Barakaldo, the one on the right bank, the Amorebieta–Durango or the Arrigorriaga–Basauri axes), there is concern about the lack of connection, both intra- and intermunicipally, between many of the existing routes.

> "We may find that some municipalities created their bike lanes on the road, while others incorporated them on the sidewalks, or that once you reach the end of one municipality, the municipality you arrive at does not have a bike lane where the other one ends." (E4).

- Among the social barriers, the absence of a culture associated with the bicycle as a viable option that citizens consider as an alternative for mobility in the cities and municipalities of Bizkaia is particularly relevant. According to most experts, the bicycle is still more related in the social consciousness to leisure and sports practice rather than to mobility.

> "We have not yet internalized the bicycle as a means of alternative urban mobility and we relate it more to sporting or leisure practices." (E5)

This is a consequence of the hegemonic car culture that has shaped both our cities' urban design and the surrounding environment for decades. Many interviewees believe that any policy promoting bicycle use necessarily involves discussing motorized vehicles and measures to reduce their presence in cities.

> "For a century, car culture has prevailed as the fastest, safest element, etc. And that dominant culture is what prevails in today's society. And although we have relatively changed, we still see the bicycle in the urban environment as a disruptive element." (E2)

- The perception of insecurity is one of the subjective barriers that can diminish interest in cycling. It manifests in two aspects. Firstly, traffic insecurity arises from the perception of physical risk when cycling in spaces inadequately designed for safe use (insufficient width of paths, lack of connectivity, poor or inadequate lighting, unsuitable pavement, sharing space with other vehicles in inappropriate situations, etc.) or due to insufficient skills or technical abilities with respect to cycling by the individual. Secondly, personal insecurity refers to the perceived risk of bicycle theft and the lack of available secure parking; however, this issue received little attention from the interviewed individuals.

On the other hand, traffic insecurity is reiterated as one of the main subjective barriers to overcome in order to successfully promote urban bicycle use.

> "The pandemic has shown that the issue with bicycle use is the widespread presence of motor vehicles, which adds the risk factor." (E2)

In fact, one of the most controversial issues arises regarding the need for segregated spaces for bicycles in order to increase this perception of safety. The majority of the sample supports having dedicated lanes exclusively for bicycles, believing that ensuring the creation of these spaces will increase demand by enhancing the feeling of safety and road protection. Others are not in favor of segregated cycling lanes.

> "By bringing traffic to 30 or 20 km/h, prioritizing traffic lights for public transport, bicycles, and pedestrians…it would be enough. Segregated lanes were necessary at one time because there wasn't enough space in the built city to ensure safe spaces for bicycles, but we have erred a lot in this because the trend has been to eliminate space for pedestrians and there has been a push to promote a bicycle culture at the expense of space for pedestrians. Among other reasons, because there hasn't been the political will to remove cars and make room for bicycles." (E2)

There is also agreement that fear stemming from a lack of skills or abilities for proper bicycle handling increases the perception of traffic insecurity. Addressing this sense of incompetence is considered a basic requirement to foster even minimal interest in bicycle use. It is the kind of factor whose presence does not ensure bicycle use, but its absence guarantees disaffection. In this regard, several interviewees highlight that a significant portion of the population lacks bicycle riding skills, both among adults and school-age children.

Although all the mentioned barriers are perceived as being closely interconnected, one of the interviewees emphasizes that not all barriers carry the same differential weight. Thus, they suggest a sort of priority relationship that can be inspiring when combating these barriers:

> "The priority barriers are cultural in nature. We need time to change our habits. The next obstacle is the physical environment, topography, urban layout, and infrastructure design. The third barrier is fear or insecurity. The bicycle is a fantastic means of transport, but you need to know how to ride a bike, have a certain skill, and not everyone knows because, in the case of the bicycle, your body is the chassis, the bumper against any kind of trouble. Once the safety element is overcome, other demands related to the quality of space and infrastructure designs will emerge, including their user-friendliness, aesthetics, etc. But the first step is overcoming the issue of safety and also the cultural aspect; that is, raising awareness and internalizing the benefits of bicycle use throughout society." (E6)

3.3. Essential Conditions Needed by the Public for Bicycle Use

According to the experts consulted, the public would be willing to use bicycles as a means of urban transportation if they had as many facilities as possible so that integrating bicycle use into their lifestyles and modes of transportation would occur naturally. Based on this consensus, the facilitating factors mentioned as essential in any bicycle promotion process are:

- Existence of a network of connected bicycle paths (bidegorris).

> "It is necessary to provide the public with all possible facilities. There must be minimum requirements such as cycle path networks because people are afraid to ride on the road, secure bicycle parking, and above all, interurban bicycle lending systems." (E7)

- Public bicycle lending systems located strategically considering the flow of traffic.
- Secure and strategically located public parking lots to prevent their supply from negatively affecting public space.
- Quantity and quality of infrastructure, within a quality plan, ensuring sufficiently wide lanes, with appropriate pavement and sufficient lighting, minimizing design

issues that may arise from public space, streets, as a built environment because of its potential impact on the decision to cycle.

> "Cycling in the summer, in an area of the city without trees, is very difficult, and cycling in winter during rainy periods where water doesn't drain well is also challenging. The impact of street design on the decision to cycle has not been sufficiently considered. Therefore, transformations of the infrastructure of the built environment should be considered." (E4)

- Involvement of private entities (from companies to educational centers, including shopping, cultural, and sports centers, etc.) through facilitative measures, to complement the existing institutional efforts.
- Multimodal mobility, to make longer distances viable, although it would require "a structural change even in the infrastructure itself so that bicycles can access wagons where at least 50% of their capacity is allocated to bicycles." (E4)

However, these facilitating factors would have limited impact without what this group of experts considers the primary condition: a broad cultural shift. This shift should not only enhance the social perception of bicycles by emphasizing their benefits and virtues, but also challenge the entrenched car culture and its impact on sustainable development goals, especially urban sustainability. There is a call for education, the need to raise awareness among the public, regardless of whether they are bicycle users or not. It is perceived as crucial to highlight the bicycle as a useful, attractive, and trendy element. A cultural change is needed, capable of impacting all stakeholders, groups, and society at large, from a pluralistic, comprehensive, and inclusive perspective that does justice to the democratic and diverse nature that characterizes the bicycle as a social tool.

3.4. Main Challenges and Strategic Action Proposals

This section outlines the main challenges and strategic actions proposed by the expert individuals interviewed to tackle the challenge of expanding the use of bicycles as a sustainable urban mobility element in Bizkaia. These challenges and their prioritization are the result of analysis and interpretation conducted by the research team based on the interview results.

Challenge 1. Consolidating a multilevel, cross-cutting, and intersectoral governance system aimed at ensuring dialogue, reflection, and cooperative work dynamics that guarantee coordinated actions. In such a system, all social actors must feel challenged and willing to assume their share of responsibility in this transition toward sustainable urban mobility.

Challenge 2. Strengthening the cycling infrastructure network and integrating the Historical Territory of Bizkaia as a whole.

Challenge 3. Generating demand for the use of bicycles as a means of sustainable urban mobility and optimizing the already established habits of bicycle use as a leisure practice as a facilitating element in the expansion of this means of urban travel.

Challenge 4. Dignifying the social image of the bicycle and its contribution to the Sustainable Development Goals (SDGs) in general, and to sustainable urban development in particular, by accelerating the cultural change required for these transition processes.

Challenge 5. Recovering public space for people through promoting sustainable urban mobility and using bicycles as an alternative means of urban transportation. This will facilitate essential activities for well-being such as walking, commuting, socializing, interacting, playing, or simply being.

Challenge 6. Implementing new measures aimed at increasing road safety (both objective and subjective or perceived) and personal safety. These measures should be designed to eliminate or mitigate the risk factors associated with using bicycles as a means of transportation.

Challenge 7. Contributing to establishing and maintaining the habit of using bicycles among citizens as an alternative sustainable means of transportation.

Challenge 8. Adopting measures aimed at professionalizing the bicycle sector as an alternative for sustainable mobility.

Challenge 9. Contributing, through sustainable mobility and the use of bicycles as a means of urban transportation, to the transformation of cities and municipalities in the Historical Territory of Bizkaia, in line with the priorities established by the SDGs and the new urban agenda.

Challenge 10. Optimizing the potential of bicycles as instruments of social transformation, capable of promoting respect, coexistence, and social support, reducing inequalities, and fostering equal opportunities.

According to the experts consulted, overcoming these challenges is conditioned by the implementation of various strategic actions. It is important to clarify that there is no direct correspondence between challenges and actions, so that each challenge is associated with a specific action; on the contrary, the same action can be connected to several challenges and the same challenge can be linked to various actions. Among the multiple strategic actions suggested for overcoming the challenges mentioned above are:

Action 1. Reducing the presence of motor vehicles in cities, as well as adapting and improving the urban environment, both built and natural, to the needs of people and non-motorized means of transportation, in line with the SDGs and the policies of other international organizations such as the WHO.

Action 2. Prioritizing strategic groups for the promotion and expansion of bicycle use, namely the children and youth population, using leisure as a driving force to attract new users.

Action 3. Connecting the existing network of cycle paths (including those for leisure) with those planned or under construction and integrating them with the internal network of municipal and intermunicipal cycling infrastructure.

Action 4. Generating and communicating updated narratives (institutional and non-institutional) about bicycles and motor vehicles, highlighting the benefits, functionalities, and contributions of both modes of transport to sustainable urban development and debunking misconceptions associated with them.

Action 5. Developing strategic urban cycling infrastructure plans (a coordinated approach among territorial, metropolitan, intermunicipal, and municipal levels), considering both the quantity and quality of the infrastructure, intermodality, and public–private collaboration.

Action 6. Boosting cross-cutting presence of cycling mobility in all public policies, especially those focused on sustainable urban mobility.

Action 7. Implementing technology (digital and non-digital) to promote urban bicycle use, serving human intelligence to resolve and improve existing mobility issues.

Action 8. Promoting measures that encourage the involvement of women in all areas related to urban cycling, aimed at counteracting the strong masculinization of the sector.

Action 9. Promoting new professional roles emerging around urban cycling (bicycle route guides, bike couriers, urban delivery by bicycle, etc.) which are largely not recognized at the European level (European Catalogue of Professions) and for which there is also no existing training on offer.

Action 10. Adopting measures to recognize the value of social agents (institutions, companies, associations, foundations, educational centers, etc.), who contribute to sustainable urban mobility and the expansion of urban bicycle use through their work or business model. For example, fiscal policies and other types of aid (negative ecotax, elimination of

income tax in specific cases, annual bonuses as incentives for urban bicycle use, etc.), also for vulnerable and at-risk groups.

Action 11. Involving multiple actors and social agents, from institutions to anonymous citizens, including organized society.

Action 12. Creating observatories or similar organizations dedicated to the systematic and standardized collection of data on urban bicycles, allowing for data quantification and the generation of indicators on the evolution and impact of cycling mobility.

The figure below (Figure 3) illustrates the different challenges and their connections with the strategic actions to be implemented to advance toward sustainable urban mobility through cycling in Bizkaia.

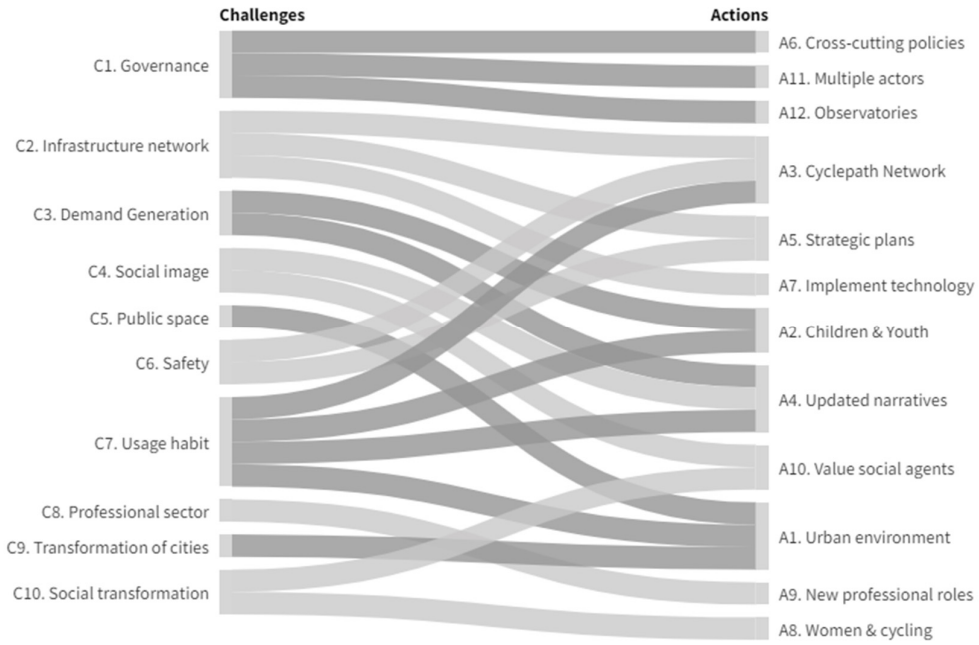

Figure 3. Challenges and strategic actions for the promotion of bicycle use as an alternative means of urban mobility in Bizkaia.

4. Discussion

This work analyzes the evolution and current situation of bicycle use in Bizkaia (Basque Country, Spain) and delimites, based on the expert voices consulted, the main challenges and strategic actions to be undertaken to achieve its expansion as a means of sustainable urban travel. Some of its limitations have to do with the restricted size of the sample, the use of exclusively qualitative data, or the contextualization of the study in a specific geographical environment (Bizkaia, Basque Country, Spain), knowing that any process of promoting urban cycling is influenced by a complex network of factors unique to each city. However, it is also true that, regardless of their uniqueness, numerous studies increasingly highlight certain factors essential for successfully transitioning to sustainable urban mobility [50,51]. These studies identify, as several recurring "key factors", distance [23,52], available infrastructure (including parking and other facilities) [53,54], public bicycle-sharing systems [52,55], necessary equipment (clothing, footwear, and accessories relevant for increasing user comfort and safety), cost–benefit balance [30], subjective factors (available skills and knowledge, attitudes and preferences, existence or not of the habit of using the bicycle) [56,57], and the social environment [58,59]. The progress and challenges of European cities (Amsterdam, Copenhagen, Barcelona, or Sevilla), benchmarks in the use of bicycles, underline the suitability of the priorities set for Bizkaia. Specifically, the experiences of Amsterdam or Copenhagen endorse the suitability of electric bicycles as a strategy

to attract people over 60 years of age and extend the distance of cycling routes over 7.5 km, ratify the potential of multimodality, which, together with public bicycle loan systems, has helped expand the benefits of cycling as a means of urban travel, and confirm that a new pro-bicycle culture feeds back on external policies and initiatives (campaigns, marketing, etc.), as well as on individual and collective experiences, all of which are authentic triggers of attitude changes [46,47,60].

The results of the present research are in harmony with those key factors, while also emphasizing the centrality of other more general factors. Among them, the need for supra-municipal policies, under governance models that ensure coordination, cooperation, and involvement of all stakeholders. The following five basic premises are presented as the main contribution of this study. These premises encapsulate some of the essential knowledge that must be considered in any strategy to promote bicycles as an alternative means of sustainable urban mobility.

First premise: any strategy to promote cycling is a long-term process, a marathon that increases its chances of success as the process advances.

Most of the strategic plans discussed at international, European, and Spanish levels, among others, confirm that expanding bicycle use in cities involves overcoming multiple milestones and phases, requiring a decisive and sustained commitment from public institutions, with results that may not be seen in the short or medium term. The evolution of cycling habits in Bizkaia and its municipalities has been generally positive over recent years. However, much more must be done to promote the perception of Bizkaia as bike-friendly and for cycling to become a viable, safe option for urban travel beyond leisure and tourism. Institutional efforts in favor of cycling may encounter various resistances, not only structural but also social and subjective, which are often less prone to change. These counterforces may explain why progress achieved at certain process stages does not always match the impetus and resources allocated by institutions.

Second premise: any proposal to promote urban cycling must be approached, at a minimum, from an intermunicipal perspective or, ideally, a metropolitan, territorial, regional, or national perspective.

It is noted that another obstacle to the expansion of urban cycling is often the heterogeneity of the paces found in these processes of transition toward active mobility, both regarding the adoption of measures and the achievements reached by each agent, municipality, city, or territory. In Bizkaia, not all municipalities in the Historical Territory are progressing in this challenge at the same pace; indeed, Bilbao, the capital of Bizkaia, is mentioned as a benchmark to consider for its commitment to urban cycling and the advances made. Although there is noticeable room for improvement in all municipalities of Bizkaia, the goal is for growth to be as synchronized, collective, and cooperative as possible. This complex and holistic view of the context requires a multilevel, transversal, and cross-sector governance model, supported by principles of shared responsibility, cooperation, and solidarity. Only in this way can it be ensured that all social agents (from the public administration to anonymous citizens, through organized society) assume their share of responsibility in this transition toward sustainable urban mobility.

Third premise: any strategy favoring urban cycling must be visible within the framework of policies for sustainable urban development, the climate crisis, and the pursuit of new development models, emphasizing its links to health, well-being, and the common good.

It has been shown that times of uncertainty and crises in various areas (energy, economic, labor, social, environmental, health, etc.) can become opportunities to democratize urban cycling. More specifically, the COVID-19 pandemic, the integration of sustainable development policies into political agendas, even at the local level, as well as the growing

citizen awareness of the urgent need to address the climate crisis, point to cycling as an alternative perfectly aligned with global strategies for sustainable development and as an optimal solution to tackle the issues of the interconnected global world in which we live.

Fourth premise: expanding bicycle use as an alternative urban transportation method involves overcoming the hegemonic culture of motor vehicles and consolidating a collective culture in favor of bicycles, promoting their benefits and optimizing the possible transfers from sports leisure styles, while addressing the various barriers hindering their social penetration.

The main perceived barriers are social and relate to the absence of a culture associated with bicycle use, fostered by the dominance of a motor vehicle culture prevailing for decades. Additionally, structural barriers, primarily associated with limitations in the cycling infrastructure network, both at the territorial and inter- and intramunicipal levels are critical. The limited coordination among public institutions and the resistance posed by the automobile lobby, especially the electric vehicle sector, to changes favoring bicycles are structural barriers that must also be mentioned. Lastly, but not less important, subjective barriers emerge, among which the perception of road safety concerns still prevalent in the collective imagination stands out, associating bicycles with the idea of risk.

Fifth premise: providing the population with adequate conditions for urban cycling to become a viable and desirable mobility alternative entails making available the greatest number of facilities possible.

In this way, incorporating this habit into different lifestyles will occur naturally. Among these facilities, connected and secure infrastructures, public bike-sharing systems, secure parking facilities, intermodality, and care for the urban built environment stand out. However, resources of a different nature should not be overlooked, such as training (acquisition of skills and abilities) or opportunities for enjoyment, social interactions, and community development.

5. Conclusions

The strategic challenges and actions outlined in this study align closely with those identified in the literature and in the praxis of reference cities in the expansion of bicycle use, such as Amsterdam, Copenhagen, Barcelona, or Sevilla [24,46,47,60–62]. They all seem to assume that increasing the modal share of urban cycling involves, at least, the achievement of four fundamental challenges: a pro-bicycle culture, grounded in an attitudinal and behavioral shift in society at large, to overcome the hegemonic culture of motorized vehicles; a change in urban mobility patterns toward active transportation modes, optimizing multimodal possibilities; a collaborative and multilevel governance model, multisectoral, led by a determined political will and equipped with the necessary budget; a strategic development supported by integrated planning and action involving all social agents and stakeholders; and an environment equipped with facilitating elements for the social penetration of this habit, encompassing sufficient and quality infrastructure, incentives, public service provisions, under economically accessible conditions for all citizens.

Future lines of research should focus on comparative studies aimed at learning about the progress and impacts achieved in different cities and territories, encouraging the transfer of knowledge and inspiring initiatives in more and more parts of the world. Longitudinal studies are also a challenging challenge, which would make it possible to learn about the difficulties and facilitating factors in each phase of these transition processes toward sustainable urban mobility. Similarly, studies with a mixed methodological design should be promoted, focusing not only on the role of structural factors, but also on subjective factors. For example, there are still few autoethnographic studies that explore the travel experiences that the bicycle provides, the processes of negotiation with barriers, or the

psychosocial keys to consolidate adherence to these new mobility patterns among citizens. Finally, and from a more pragmatic perspective, it would be essential to explore and implement new models of governance, capable of addressing the complex challenges that the horizon of mobility and sustainable urban development pose.

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