

Micromobility in Sustainable Urban Transport: Safety Challenges and Regulatory Responses

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Micromobility has become an important component of urban transport, offering flexible and environmentally friendly solutions for short-distance travel. Electric scooters and bike-sharing systems are increasingly integrated into sustainable mobility strategies aimed at reducing emissions and reliance on private cars. However, their rapid expansion has introduced safety challenges, including increased crash rates, conflicts with pedestrians, and regulatory gaps. This paper examines the relationship between micromobility growth, safety risks, and regulatory responses based on recent literature and comparative analysis. Findings indicate that micromobility can improve sustainability and accessibility, but its success depends on integrating safety into infrastructure, regulation, and user behavior, consistent with the Safe System approach.

Key Words: micromobility, road safety, sustainable urban mobility, transport policy, Safe System approach

1. INTRODUCTION

Urban mobility systems are undergoing a profound transformation driven by growing environmental challenges, technological innovations, and changes in travel behavior. Cities face numerous transport-related problems, including traffic congestion, air pollution, greenhouse gas emissions, and risks to road safety. Accordingly, policy frameworks emphasize the need for a transition toward more sustainable and low-carbon mobility systems.

Within this transition, micromobility has emerged

as one of the fastest-growing segments of urban transport. Micromobility generally refers to small, lightweight vehicles that operate at relatively low speeds and are most commonly used for short trips, particularly within so-called first-mile and last-mile segments of travel. This category includes electric scooters (e-scooters), electric bicycles, conventional bicycles, and other small electric personal mobility devices [1]. The rapid expansion of shared micromobility systems, particularly dockless e-scooters, has significantly reshaped urban mobility patterns in many cities since 2018.

From the perspective of sustainable mobility, micromobility offers several potential benefits. These include reductions in greenhouse gas emissions, improved accessibility for short trips, and greater flexibility within multimodal transport systems [2].

Despite these advantages, the rapid expansion of micromobility has also introduced numerous safety

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challenges and regulatory dilemmas. One of the most significant concerns relates to the growing number of traffic injuries associated with electric scooters. Several studies indicate an increase in emergency department visits and hospitalizations related to e-scooter crashes in cities where shared micromobility systems have been introduced [3, 4]. Injury patterns often include head injuries, fractures, and soft-tissue injuries, which are frequently associated with low rates of helmet use among riders.

Another major challenge concerns conflicts between micromobility users and other vulnerable road users, particularly pedestrians and cyclists. In many cities, the lack of dedicated infrastructure forces e-scooter riders to share space either with pedestrians on sidewalks or with motor vehicles on roadways. These spatial conflicts increase the risk of collisions and contribute to negative public perceptions of micromobility [5].

Infrastructure design also plays a crucial role in determining the safety performance of micromobility systems. Many existing urban transport networks were not originally designed to accommodate new forms of personal mobility vehicles. As a result, poor pavement conditions, inadequately designed intersections, and the absence of dedicated cycling infrastructure may significantly increase the risk of traffic crashes for micromobility users [6].

These safety challenges have sparked a broad debate regarding the appropriate regulatory framework for micromobility vehicles. Governments and local authorities around the world have adopted a variety of regulatory approaches, including speed limits, age restrictions, helmet requirements, and restrictions regarding the areas in which these vehicles are permitted to operate.

However, regulatory responses remain highly heterogeneous across countries and cities. While some jurisdictions have developed relatively comprehensive regulatory frameworks, others still lack clear legal definitions and operational rules for micromobility vehicles. In many cases, regulatory systems struggle to keep pace with the rapid technological development and market expansion of shared micromobility services.

In this context, the integration of road safety principles into micromobility policies becomes a critical issue. The Safe System approach, founded on the principle that transport systems must accommodate human error while preventing fatal and serious injuries, provides an appropriate framework for addressing the safety challenges associated with micromobility. Its implementation includes safer infrastructure design, speed management, vehicle

regulation, user behavior improvement, and comprehensive urban traffic management measures.

Despite the growing body of scientific literature on micromobility, several research gaps remain. First, many studies focus primarily on injury statistics, without a more comprehensive consideration of the broader policy and regulatory implications of micromobility expansion. Second, safety issues related to micromobility are often insufficiently integrated into the broader framework of sustainable urban mobility policies. Third, comparative analyses of regulatory responses across different jurisdictions remain relatively limited.

The remainder of this paper is structured as follows. The next section examines the concept of micromobility, its sustainability benefits, and its role within strategic urban transport policies. This is followed by an analysis of the main safety challenges associated with micromobility, including crash patterns, vulnerable road users, and speed-related risks. The paper further reviews regulatory approaches and discusses the application of the Safe System approach and other measures aimed at improving micromobility safety within sustainable urban transport systems.

2. MICROMOBILITY WITHIN SUSTAINABLE TRANSPORT STRATEGIES

2.1. Concept and Forms of Micromobility

The concept of micromobility has attracted increasing attention in recent years. Although definitions vary across academic and policy documents, micromobility generally refers to small, lightweight vehicles that operate at relatively low speeds and are intended for short-distance travel. These vehicles are typically powered either by human effort or small electric motors and are commonly used for trips shorter than 5–8 km [1].

The micromobility ecosystem encompasses a variety of vehicle types, with bicycles, electric bicycles (e-bikes), and electric scooters (e-scooters) being the most prevalent. In recent years, electric scooters have emerged as the fastest-growing form of micromobility, primarily due to the rapid development of app-based shared mobility platforms. These systems allow users to locate, unlock, and pay for vehicle use through mobile applications, enabling convenient access without the need for private ownership [7].

Micromobility services can generally be divided into two main models: privately owned micromobility devices and shared micromobility systems. Private devices include personal bicycles or electric scooters that individuals use for daily travel or recreational purposes. Shared micromobility systems, on the other hand, involve fleets of vehicles managed by private

companies or local authorities that are available to users through short-term rental. The main charac-

teristics of the most common micromobility modes are presented in Table 1.

Table 1. Main forms of micromobility in urban transport systems.

Mode	Propulsion	Typical speed	Typical trip length	Infrastru-cture
Bicycle	Human powered	15-25km/h	2-8km	Bike lanes
Electric bicycle	Electric assist	25km/h	3-10km	Bike lanes
Electric scooter	Electric motor	20-25km/h	1-5km	Bike lanes/streets
Shared scooters	Electric motor	~20km/h	1-3km	Urban streets

2.2. Benefits of Micromobility

From a sustainability perspective, micromobility offers several potential benefits that may contribute to the transformation of urban transport systems. One of the most frequently highlighted advantages relates to the reduction of greenhouse gas emissions associated with short trips made by private passenger cars.

In addition to environmental benefits, micromobility can contribute to greater efficiency and flexibility within urban transport networks. Since micromobility vehicles occupy considerably less space compared with private passenger cars, they enable more efficient use of urban infrastructure and may help reduce traffic congestion in urban areas.

Another important advantage of micromobility lies in its ability to improve accessibility and connectivity within multimodal transport systems. Micromobility services can complement public transport by addressing the so-called first-mile/last-mile problem, which refers to the difficulty of accessing public transport stations from residential areas or reaching the final destination from transit stops.

By providing simple and rapid connections between transit stations and urban destinations, micromobility can increase the attractiveness and usability of public transport systems [1].

Micromobility contributes to improve air quality and urban space efficiency. In addition, reduced dependence on private passenger cars may lead to improvements in air quality, reductions in urban noise, and the development of more pedestrian-friendly public spaces.

Nevertheless, the sustainability benefits of micromobility are not always guaranteed. Some studies indicate that a portion of micromobility trips replaces walking or public transport rather than private car trips, which may limit the environmental benefits. Furthermore, the life cycle of micromobility vehicles-including manufacturing, battery production, and vehicle maintenance-may influence the overall environmental performance of micromobility systems [2].

2.3. Micromobility in Strategic Transport Policy Documents

The growing importance of micromobility is increasingly recognized within international transport policy frameworks and strategic planning documents. In this context, micromobility is often viewed as an important component of broader strategies aimed at creating more sustainable and resilient urban transport systems.

At the European level, the European Green Deal represents one of the most significant policy initiatives shaping the future of sustainable transport. The promotion of active mobility and low-emission transport modes, including micromobility solutions, is recognized as one of the key elements for achieving these objectives.

Similarly, the concept of Sustainable Urban Mobility Plans (SUMP) has been widely adopted in European cities as a strategic framework for integrating different transport modes into coherent and sustainable mobility systems. In many cities, micromobility services are increasingly incorporated into SUMP frameworks as complementary mobility options that can improve accessibility and reduce dependence on private passenger cars.

International organizations have also recognized the growing role of micromobility vehicles in urban transport systems. Reports published by the International Transport Forum (ITF) and the Organisation for Economic Cooperation and Development (OECD) emphasize the importance of integrating micromobility into broader sustainable mobility strategies while highlighting that road safety must remain a central element of policy development [8].

Nevertheless, despite the increasing recognition of micromobility's importance, its integration into transport planning frameworks remains uneven across cities and countries. In some jurisdictions, micromobility has been rapidly incorporated into urban mobility strategies, supported by investments in infrastructure and the development of regulatory frameworks. In other cases, the sudden emergence of shared

micromobility systems has outpaced policy development, resulting in regulatory uncertainty and operational challenges.

3. SAFETY CHALLENGES OF MICROMOBILITY

3.1. Typical Risks and Crash Patterns

The rapid expansion of micromobility has introduced a new set of safety challenges into urban transport systems. Several studies conducted in recent years indicate a significant increase in injuries associated with the use of such vehicles, particularly in cities where shared micromobility systems have been introduced [3, 4, 9]. One of the most common types of incidents involving micromobility vehicles are single-vehicle crashes, which most frequently occur due to loss of vehicle control, irregularities in the road surface, or insufficient rider experience. Research shows that a large proportion of injuries associated with micro-mobility vehicles result from falls rather than collisions with other vehicles, particularly among e-scooter users treated in emergency departments [3,4]. Factors such as uneven pavement surfaces, potholes, wet road conditions, or sudden braking can easily destabilize riders due to the relatively small wheels and narrow wheelbase that characterize many of these vehicles [6,11]. These design characteristics make electric scooters particularly sensitive to poor infrastructure conditions compared with bicycles.

Another significant crash scenario involves collisions with motor vehicles, especially in situations where micromobility users travel within mixed traffic conditions. In cities where adequate or well-developed infrastructure for micromobility vehicles does not

exist, users are often forced to share the roadway with passenger cars, buses, and heavy vehicles. Such situations significantly increase crash risks due to large differences in travel speed and issues related to visibility. Drivers of motor vehicles often have difficulty detecting micromobility users, particularly in complex urban traffic environments such as intersections.

In addition to collisions with motor vehicles, conflicts between micromobility users and pedestrians are becoming an increasingly significant issue. These interactions most commonly occur when micromobility vehicles are used on sidewalks or within pedestrian zones due to the lack of appropriate infrastructure. In many cases, conflicts with pedestrians arise not only from direct collisions but also from the perceived risk and feelings of insecurity caused by the presence of relatively fast-moving vehicles within pedestrian spaces.

Nighttime riding presents additional safety risks and reduced visibility conditions. Inadequate lighting equipment or insufficient street illumination can increase the risk of crashes for both riders and other road users [3,4]. In addition, alcohol consumption has been identified as a contributing factor to micromobility-related crashes, particularly during late evening hours in areas with active nightlife.

Head injuries are among the most frequently reported severe injuries in crashes involving these vehicles, highlighting the importance of helmet use and other protective equipment [3, 4]. The relationship between the main micromobility safety risks and corresponding policy responses is illustrated in Figure 1.

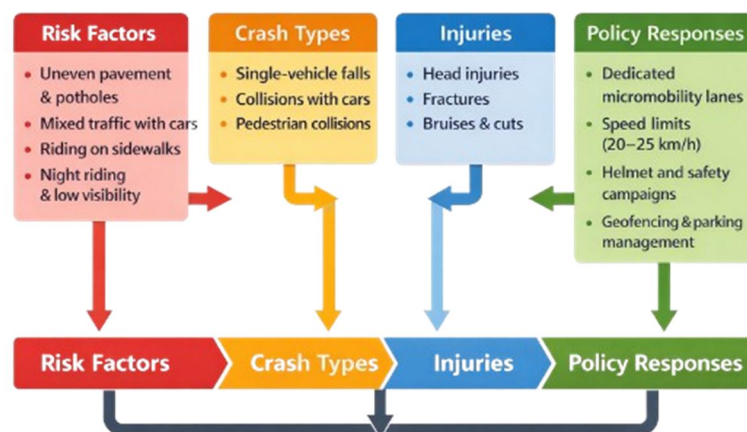


Figure 1 - Structure of micromobility safety risks and policies

3.2. Vulnerable Road Users and Risk Perception

The expansion of micromobility has also raised significant concerns regarding its impact on vulnerable road users, particularly pedestrians, children, older adults, and persons with disabilities. These groups may experience higher levels of both perceived risk and

actual exposure to conflicts with micromobility vehicles in urban environments [3, 4, 5, 6, 8, 10, 11].

Pedestrians represent one of the most vulnerable groups in interactions with micromobility users. In cities where micromobility vehicles are frequently used on sidewalks, pedestrians may encounter fast-

moving vehicles that are relatively quiet and difficult to detect. Such situations may create safety risks and reduce the perceived safety and accessibility of pedestrian spaces. Older pedestrians may be particularly vulnerable due to slower reaction times and reduced mobility [10].

Children also represent an important group in the context of micromobility safety [9]. In some cities, younger users may operate micromobility devices without sufficient riding experience or knowledge of traffic rules. This lack of experience may increase the likelihood of crashes and risky behavior.

Another important issue concerns risk perception among micromobility users themselves. Many users may underestimate the risks associated with operating micromobility vehicles in urban traffic environments [3,10]. Studies conducted in several cities indicate that helmet use among micromobility users remains very low. For example, observational studies of e-scooter users reported that more than 90% of riders did not wear helmets [3].

3.3. *The Influence of Vehicle Speed and Mass*

Speed represents one of the most important factors affecting both the probability of crash occurrence and the severity of consequences in traffic systems. In the context of micromobility, the speed characteristics of micromobility vehicles play a significant role in determining their safety performance [12, 13, 6, 8].

Most micromobility vehicles available in shared mobility systems have a maximum speed ranging between 20 and 25 km/h [8]. Although these speeds are lower than those of motor vehicles, they are significantly higher than the average walking speed of pedestrians. This speed differential can create considerable safety risks when such vehicles are used within pedestrian areas.

Research on injury severity indicates that even relatively moderate speeds may result in injuries in the event of a fall or collision with other road users [12,13]. The absence of protective vehicle structures means that riders are directly exposed to impact forces during a crash. Unlike passenger vehicles, which include numerous passive safety features such as seat belts, airbags, and protective vehicle bodies, micromobility vehicles provide a minimal level of physical protection.

Another factor influencing injury severity is the total mass of the device and rider combined [6]. Although electric scooters are relatively lightweight compared with motor vehicles, their combined mass with the rider can generate considerable impact forces during collisions.

A comparison between micromobility vehicles and bicycles provides useful insights into relative safety

risks [6]. In contrast, the small wheels of many electric scooters make them more sensitive to instability when encountering road surface irregularities.

For these reasons, many cities have introduced speed limits and operational regulations for micromobility vehicles. Speed limits in the range of 20–25 km/h are common in many jurisdictions, while even lower speeds are often enforced in pedestrian areas through digital technologies such as geofencing.

4. REGULATORY FRAMEWORK AND TRANSPORT POLICY OF MICROMOBILITY

4.1. *Regulatory Frameworks in the European Union and Selected Cities*

The rapid expansion of micromobility has forced policymakers to respond to new challenges related to road safety, infrastructure, and the management of urban transport systems.

Within the European Union, there is no single harmonized regulatory framework governing micromobility vehicles. Instead, individual member states define the legal status of electric scooters and other personal mobility devices within their national road safety legislation.

One of the most frequently applied measures concerns the limitation of the maximum operating speed of micromobility vehicles. Speed limits between 20 and 25 km/h represent the dominant regulatory approach across European jurisdictions [8]. In some cities, even lower speed limits are applied in pedestrian zones or densely populated urban areas, often enforced through digital technologies such as geofencing.

Another important regulatory element concerns the permitted operating space for micromobility vehicles. In many jurisdictions, micromobility vehicles are allowed to operate on cycling infrastructure, while their use on sidewalks is prohibited. However, in cities where cycling infrastructure is insufficiently developed, the lack of adequate space for riding may lead to difficulties in enforcing these rules and continued riding on sidewalks. Many regulatory frameworks also establish a minimum age requirement for the use of micromobility vehicles. Age limits most commonly range between 14 and 18 years, depending on national legislation. In some countries, basic knowledge of traffic regulations or participation in road safety education programs is also required, although significant variation exists among national legal frameworks [8]. The requirement to wear helmets represents another area in which regulatory approaches vary considerably. While some countries mandate helmet use for all micromobility users, others merely recommend it or require it only for younger users, reflecting differences in national approaches to

balancing safety and accessibility [8]. Cities such as Paris, Berlin, Copenhagen, and Barcelona have also introduced specific policies for managing shared micromobility fleets.

The evolution of regulatory approaches toward micromobility in Europe is presented in Figure 2. The objective of these measures is to ensure that shared

micromobility systems operate in accordance with broader urban mobility goals while mini-mizing negative impacts on public space and pedestrian accessibility.

A comparative overview of selected regulatory measures applied in European cities is presented in Table 2.

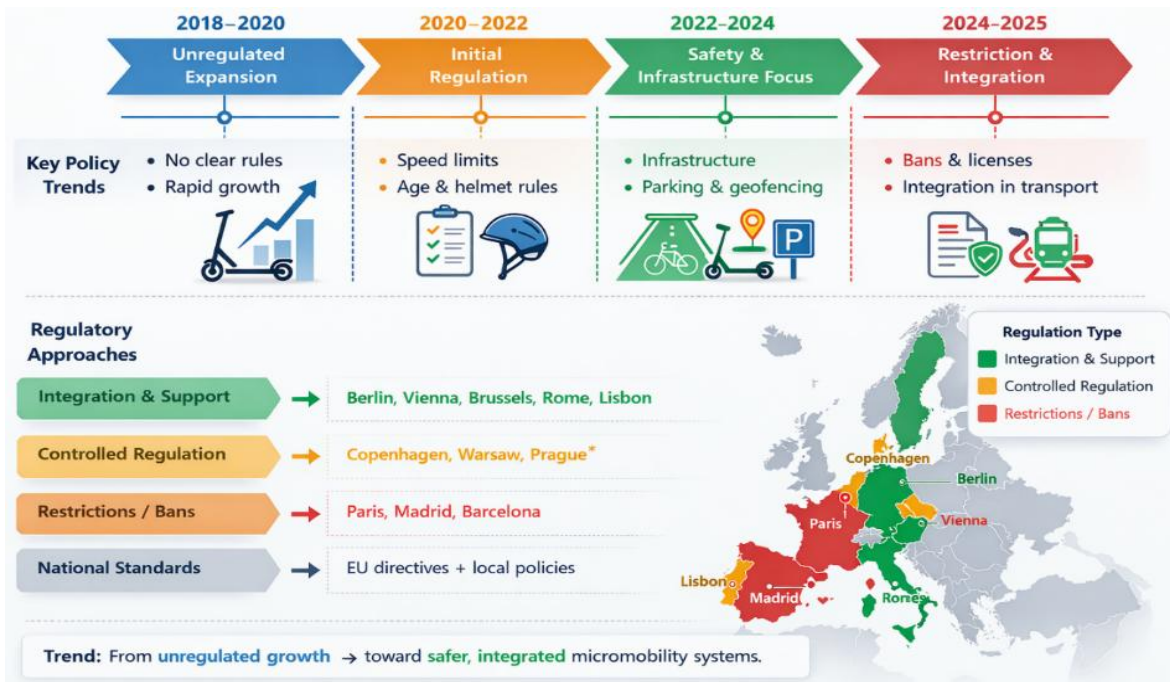


Figure 2 - Evolution of micromobility regulation in Europe

Table 2. Comparative overview of micromobility regulation in selected European cities.

City	Shared e-scooters	Max speed	Helmet rule	Minimum age	Sidewalk riding	Parking regulation
Paris	Banned	25km/h	Recommended	12	No	Not applicable
Berlin	Allowed	20 km/h	Not mandatory	14	No	Controlled
Vienna	Allowed	25km/h	Not mandatory	12	No	Parking zones
Barcelona	Restricted	25km/h	Mandatory in some zones	16	No	Strict
Madrid	Banned	25km/h	Recommended	15	No	Designated zones
Copenhagen	Allowed	20km/h	Mandatory	15	No	Parking zones
Prague	Restricted	25km/h	Recommended	15	Limited	Regulated
Rome	Allowed	20km/h	Not mandatory	14	No	Geofencing
Brussels	Allowed	25km/h	Recommended	16	No	Operator licenses
Lisbon	Allowed	25km/h	Recommended	16	No	Fleet limits

4.2. Regulation of Micromobility in the Republic of Serbia

In the Republic of Serbia, the rapid growth in the use of micromobility vehicles in recent years has led to the introduction of legal provisions regulating their participation in traffic [14]. Recent amendments to road traffic safety regulations introduced provisions

defining light electric vehicles, particularly amendments introduced through the 2023 changes to the Road Traffic Safety Law [14].

These regulations specify the technical characteristics and operational rules applicable to this category of vehicles in traffic. Micromobility vehicles are generally permitted to operate on cycling

infrastructure, where such infrastructure exists in accordance with the provisions regulating light electric vehicles [14]. In locations where cycling infrastructure is not available, users may be allowed to operate on the roadway under certain conditions.

Age restrictions have also been introduced for the use of micromobility vehicles in order to ensure that users possess an appropriate level of maturity and knowledge of traffic rules, as stipulated by the applicable Serbian legislation [14].

Despite these regulatory changes, several challenges remain regarding the effective implementation of micromobility policies in the Republic of Serbia. One of the most significant issues relates to the insufficient development of cycling and micromobility infrastructure in many cities, which limits the availability of safe operating space for micromobility users. In the absence of dedicated infrastructure, users often continue to operate in pedestrian zones or within mixed traffic conditions. Another important challenge concerns regulatory enforcement and public awareness. For this reason, public awareness campaigns and targeted traffic enforcement activities may be necessary to ensure compliance with regulations and improve overall road safety.

Local governments also play an important role in shaping micromobility policies. Municipal and city authorities may introduce additional measures related to infrastructure planning, parking regulation, and the management of shared mobility services. As micromobility continues to develop, local policies will likely become increasingly important in ensuring the safe integration of these systems into urban transport networks.

5. INTEGRATING SAFETY INTO SUSTAINABLE MICROMOBILITY STRATEGIES

5.1. The Safe System Approach and Vision Zero

The integration of micromobility into urban transport systems must be guided by contemporary road safety principles.

The philosophy of the Safe System approach originates from the Vision Zero concept. Vision Zero is founded on the ethical principle that no loss of life in road traffic is acceptable and that transport systems must be designed so that human safety takes priority over mobility efficiency.

Applying Safe System principles to micromobility requires a comprehensive understanding of how infrastructure design, vehicle characteristics, user behavior, and regulatory frameworks influence safety outcomes. Since micromobility vehicles lack protective structures, their users are particularly vulnerable in the event of traffic crashes. For this reason, transport systems must be designed to minimize the exposure of micromobility users to high-speed motor vehicle traffic and other hazardous conditions.

Safe System strategies particularly emphasize speed management as one of the key elements of road safety. In the context of micromobility, speed management measures may include lower speed limits in mixed-traffic environments, the development of dedicated infrastructure for micromobility vehicles, and the application of digital technologies to control speed in sensitive urban areas. The key components of the Safe System framework for micromobility integration are illustrated in Figure 3.

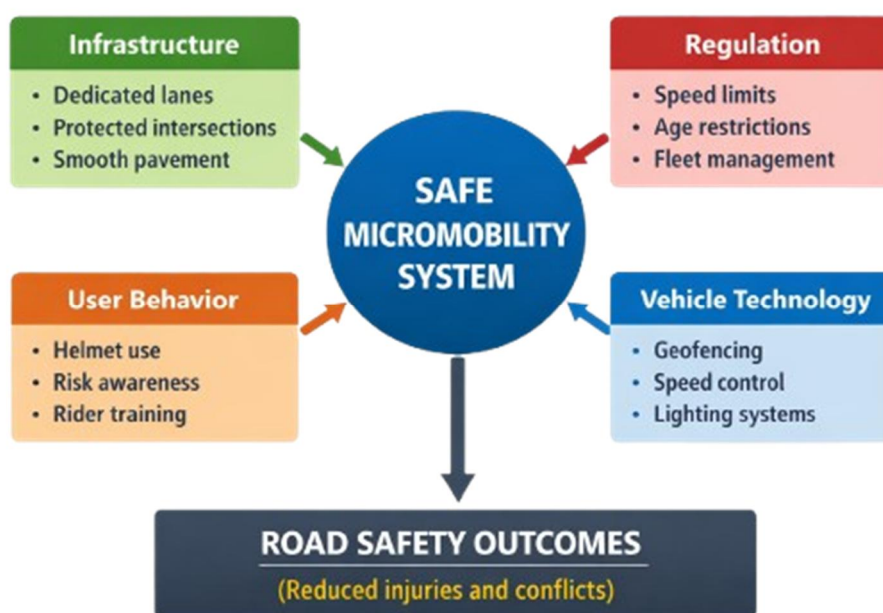


Figure 3 - Safe system framework for micromobility integration in urban transport system

5.2. Infrastructure Measures

Infrastructure design plays a crucial role in determining the safety performance of micromobility systems. Dedicated cycling and micromobility infrastructure can significantly reduce conflicts between pedestrians, micromobility users, and motor vehicles.

High-quality road surface conditions are also essential for the safe use of micromobility. Maintaining smooth and well-maintained infrastructure can significantly reduce the risk of falls and loss of vehicle control.

Intersection design represents another important infrastructural aspect. Many traffic crashes involving micromobility users occur at intersections. Infrastructure improvements such as protected intersections, improved signaling, and better street lighting can significantly contribute to reducing these risks.

Traffic calming measures, including zones with a speed limit of 30 km/h, have also proven effective in improving the safety of vulnerable road users.

Key infrastructure measures that may contribute to safer micromobility integration are summarized in Table 3.

Table 3. Infrastructure measures supporting safer micromobility integration.

Measure	Description	Expected impact
Dedicated micromobility lanes	Separation from cars and pedestrians	Reduced crash risk
Traffic calming zones	Speed limits below 30km/h	Safer mixed traffic
Protected intersections	Infrastructure redesign	Fewer collisions
Improved pavement quality	Smooth surfaces	Reduced fall risk

5.3. Non-Technical Measures

In addition to infrastructure improvements, several non-technical measures can contribute to the development of safer micromobility systems. Training programs may help new micromobility users develop basic riding skills and acquire essential knowledge of traffic rules.

Technological solutions also offer new opportunities for improving micromobility safety. For example, geofencing technology enables operators to automatically limit vehicle speed in specific zones such as pedestrian areas, school zones, parks, or city centers. Finally, effective fleet management of shared micromobility systems is essential for maintaining a safe and orderly urban environment.

6. DISCUSSION

The rapid emergence of micromobility vehicles represents one of the most significant transformations of urban transport systems in recent decades. The findings presented in this study indicate a complex relationship between the potential sustainability benefits of micromobility and the risks that arise during its integration into existing urban transport systems.

One of the key insights emerging from this analysis is that micromobility cannot be considered an inherently sustainable mode of transport if safety aspects are not adequately addressed. The growing number of injuries associated with electric scooter crashes is particularly concerning and highlights the

need for a stronger integration of safety considerations into urban mobility policies.

The analysis also shows that regulatory responses to micromobility development vary considerably across jurisdictions. While some cities have adopted proactive policy frameworks that integrate micromobility into broader sustainable mobility strategies, others continue to face difficulties in defining clear regulatory approaches.

From a road safety perspective, the Safe System approach provides a useful conceptual framework for addressing micromobility challenges.

Measures such as speed management, the physical separation of different categories of road users, and improvements in vehicle design may contribute to reducing both the probability of crashes and the severity of their consequences.

The results of this study also highlight the importance of data-driven policymaking in the development of micromobility regulation. Reliable data on crash patterns, injury severity, and user behavior are essential for understanding the actual safety impacts of micromobility systems. Strengthening systems for data collection and analysis could significantly improve the evidence base for policymaking.

Overall, the integration of micromobility into urban transport systems represents both an opportunity and a challenge. However, without sufficient attention to safety, infrastructure design, and regulatory governance, the expansion of micromobility may create new

risks that could undermine its potential sustainability benefits.

7. CONCLUSION

Micromobility has, within a relatively short period of time, become an important component of contemporary urban transport systems. These technologies have significant potential to improve accessibility, reduce dependence on private passenger cars, and support the transition toward more sustainable urban transport systems.

At the same time, the expansion of micromobility has introduced a range of safety challenges that require careful consideration by policymakers and professionals involved in transport planning and road safety. The most common crash scenarios include single-vehicle falls, collisions with motor vehicles, and conflicts with pedestrians, particularly in environments where adequate infrastructure is lacking.

The analysis presented in this paper suggests that the safety of micromobility vehicles cannot be addressed solely through regulatory measures or changes in user behavior. The Safe System concept provides an appropriate framework for developing such strategies, as it emphasizes the shared responsibility of policymakers, infrastructure designers, vehicle manufacturers, and road users in preventing serious injuries and fatalities.

One of the key findings of this study is that infrastructure plays a decisive role in determining micromobility safety outcomes. Cities with well-developed cycling infrastructure and traffic calming measures are generally better positioned to safely integrate micromobility vehicles into existing transport systems. In contrast, in urban environments dominated by motorized traffic, micromobility users may face higher levels of risk due to the lack of adequate space for safe operation.

The research also highlights the importance of coherent regulatory frameworks in managing micromobility systems. However, regulatory measures must be accompanied by effective enforcement and public awareness activities in order to ensure compliance with rules and encourage safe user behavior.

In the case of the Republic of Serbia, recent amendments to the legal framework represent an important step toward defining the legal status of micromobility vehicles within the national traffic system.

From a broader policy perspective, micromobility should not be viewed as an isolated transport mode but rather as an integral part of sustainable urban mobility systems.

Future research should focus on several important areas. First, improved systems for collecting data on traffic crashes and injuries related to micromobility are needed in order to better understand safety risks and evaluate the effectiveness of regulatory measures. Second, comparative studies analyzing different regulatory approaches across cities and countries may provide valuable insights into best practices for micromobility governance. Finally, research focused on user behavior, risk perception, and infrastructure design may contribute to the development of safer and more inclusive micromobility systems.

In conclusion, micromobility represents a promising element of sustainable urban mobility; however, its long-term success will depend on the ability of cities to integrate safety considerations into policy development, infrastructure planning, and regulatory frameworks.

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REZIME

MIKROMOBILNOST U ODRŽIVOM URBANOM TRANSPORTU: BEZBEDNOSNI IZAZOVI I REGULATORNI ODGOVORI

Mikromobilnost je postala važan deo urbanih transportnih sistema, nudeći fleksibilna i ekološki prihvatljiva rešenja za putovanja na kratkim relacijama. Električni trotineti i sistemi deljenja bicikala sve više se integrišu u strategije održive mobilnosti usmerene na smanjenje emisija i zavisnosti od putničkih automobila. Međutim, njihov brzi razvoj doneo je i bezbednosne izazove, uključujući porast nezgoda, konflikte sa pešacima i regulatorne nedostatke. Rad analizira odnos između razvoja mikromobilnosti, bezbednosnih rizika i regulatornih odgovora. Rezultati ukazuju da mikromobilnost može unaprediti održivost i dostupnost, ali njen uspeh zavisi od integracije bezbednosti u infrastrukturu, regulativu i ponašanje korisnika, u skladu sa Safe System pristupom.

Ključne reči: mikromobilnost, bezbednost saobraćaja, održiva urbana mobilnost, transportna politika, Safe System pristup