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Market Dynamics of Electric Single-Person Vehicles in Sweden: Opportunities and Challenges

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Executive Summary

The market for electric single-person vehicles in Sweden has undergone significant changes, shifting from a rental-dominated model to increasing private ownership. This transformation has resulted in both benefits and challenges, including improved accessibility, evolving consumer behaviour, and increased accident rates, particularly among young users. This study, commissioned by the Swedish government, presents a comprehensive mapping of the availability, usage, and consequences of private electric scooters. Through market surveys, user studies, and accident data analysis, we provide insights into regulatory gaps, consumer awareness, and safety concerns. Our findings highlight the need for clearer communication of existing regulations and improved consumer education to ensure the safe and responsible use of electric single-person vehicles.

Keywords: Light Electric Vehicles & Micro Mobility, Consumer Behaviour, Traffic Safety, Regulation & Standardisation, Sustainable Urban Mobility

1 Introduction

The shift towards privately owned electric scooters in Sweden has altered urban mobility patterns, creating new safety and regulatory challenges. Initially dominated by rental services, the market has expanded significantly towards private ownership. However, most previous studies have focused on shared micromobility services, particularly rental e-scooters in urban contexts. Comparatively little is known about the rapidly growing segment of privately owned electric scooters — how they are used, who uses them, and their consequences. There is also limited research on the legal awareness of private users, their compliance with traffic regulations, and the market conditions that shape consumer choices. This study aims to address these gaps. The purpose of this study is to analyse this transition, identifying market trends, safety implications, and policy considerations. Electric scooters have been widely adopted as an alternative means of transport, particularly in urban areas where traditional modes of mobility face challenges such as congestion and lack of parking spaces. As private ownership increases, so do concerns regarding road safety, pedestrian interactions, and long-term sustainability. The transition from rental to private ownership has changed usage patterns and highlighted regulatory challenges that require clear information and coordination between authorities, retailers, and users. A complete account of the results presented in this paper is available in the full report published by the Swedish transport agency Transport Analysis (Trafikanalys) in 2024 [1].

The remainder of the paper is structured as follows: Section 3 outlines market and usage trends, Section 4 highlights regulatory and safety challenges, Section 5 presents policy recommendations, and Section 6 concludes.

2. Methodology

This study was based on questions about the provision and use, effects, challenges, and opportunities associated with the increasing private use of electric single-person vehicles. To answer the questions, we used several methods: market and user surveys, interviews with stakeholders, a literature review, and analysis of accident statistics involving electric scooters.

We conducted a structured mapping and analysis of numerous online stores and several physical shops to examine the range of vehicles on the private market and the type of product and usage information provided to potential buyers. This market analysis was supplemented by interviews with retailers. Private usage patterns were studied through two web surveys aimed at households and individuals, respectively, who own one or more electric single-person vehicles.
The first survey included over 300 respondents and asked about the electric single-person vehicle most frequently used in the household and usage patterns of the main user. The second survey targeted members of Facebook interest groups for electric scooters, with over 100 respondents, focusing on the respondents' personal use and behaviour. To ensure a comprehensive analysis, data from multiple sources were cross-referenced. Surveys included respondents from various demographics to capture insights from different user groups, including commuters and leisure riders.

To describe the shared e-scooter market, we contacted both municipalities and micromobility companies. A web survey was sent to the 31 municipalities that had shared e-scooter services in 2024, asking when the services were introduced, what regulations apply, and for the municipalities' opinions on shared e-scooters. Twenty-two municipalities responded. We also held conversations with micromobility companies and visited one company for a field study, while others responded via email.

To measure the effects, challenges, and opportunities, we also conducted several stakeholder interviews — including consultations with authorities, insurers and retailers — and performed an accident data analysis based on records from Sweden's national accident database, Strada[2]. The accident data analysis focused on trends over multiple years to observe the long-term safety impact of electric scooters in Sweden.

3. Market and Usage Trends

This section presents key findings on the development and usage of electric single-person vehicles in Sweden. Based on survey data, stakeholder interviews, and market analysis, we describe what types of vehicles are available, how they are used, and by whom.

3.1 Types of Electrically Powered Single-Person Vehicles

Electrically powered single-person vehicles is a collective term for a group of vehicles that have become increasingly common in traffic in recent years. The most common type is the electric scooter, also known as an e-scooter or e-kickbike. Other variants include moped-like fat gliders and fat scooters, as well as various types of self-balancing electric boards such as e-skateboards, Segways, hoverboards, and airwheels (unicycles). These vehicles are all battery-powered and generally small compared to other means of transport, often classified under the term "micromobility." The development of new models is rapid, with an increasing variety of vehicles entering the market. Even though retailers report significant growth in sales in recent years, the exact number of privately owned electric scooters in Sweden is unknown, as they are not subject to vehicle registration.

Fig. 1. Various types of electrically powered single-person vehicles, from top left: electric scooter, different types of e-skateboards, airwheel, hoverboard, Segway, and fat glider.

In Sweden, electrically powered single-person vehicles are legally defined under the Road Traffic Definitions Act (2001:559). According to this law, an electrically powered single-person vehicle covered by our analysis may be classified as a bicycle, moped, or motorcycle, but it can also fall under the category of other vehicles.

These vehicles do not have a separate legal definition; instead, existing vehicle categories have been gradually adjusted to incorporate electric single-person vehicles into legislation.

For an electric scooter to be classified as a bicycle in Sweden, it must be designed for a maximum speed of 20 km/h and have an electric motor with a continuous rated power of no more than 250 watts[3]. If an electric scooter meets the criteria for a bicycle, the following regulations apply:

- The electric scooter must be operated in the same manner as other bicycles.
- It must have brakes and a bell.
- When used in the dark, it must be equipped with front and rear lights as well as reflectors.
- Riders under the age of 15 must wear a helmet.
- Passengers are not allowed on the electric scooter.
- It is not permitted to ride an electric scooter on sidewalks or pedestrian paths.

On December 23, 2023, amendments were made to the Traffic Damage Act (1975:1410) to clarify regulations for electrically powered single-person vehicles, such as electric scooters. The changes state that an electric vehicle without pedals or crank mechanisms is always considered a motor vehicle if it:

- Is designed for a speed exceeding 20 km/h, or
- Is designed for a speed exceeding 14 km/h and has a net weight over 25 kg.

This means that vehicles meeting these criteria must have mandatory traffic insurance, which the owner is responsible for securing. The driver must also carry proof of insurance while operating the vehicle. Examples of affected vehicles include electric scooters and self-balancing vehicles[3].

In Sweden, vehicles that exceed 20 km/h or have a continuous rated power of more than 250 watts, they are no longer classified as bicycles and are therefore subject to different regulations. When it comes to electric scooters, the most relevant legal framework is Regulation (EU) No 168/2013 of the European Parliament and of the Council on the approval and market surveillance of two- or three-wheel vehicles and quadricycles[4]. However, according to the Swedish Transport Agency, an electric scooter can never be type-approved under this regulation, partly because the regulation excludes all vehicles not equipped with a seat from its scope of application. As a result, such vehicles may only be operated within enclosed areas and not on public roads[3].

This lack of clarity creates confusion for consumers, who often struggle to determine what type of vehicle they have purchased, how it should be operated, which regulations apply, and how it should be insured.

3.2 Market Analysis Highlights Unclear Vehicle Specifications

The market analysis shows that few retailers provide detailed information about the vehicles they sell. The most comprehensive information is typically found on electronics stores' websites and specialized online retailers. Well-known brands tend to have more complete specifications, while lesser-known brands often lack basic details such as maximum speed or motor power. Information on motor power also varies significantly between brands and retailers. It is rare to find the continuous rated power listed, even though this is the measure used to define a bicycle under the Swedish Road Traffic Definitions Act (2001:559). Instead, terms like power, motor power, or maximum power are commonly used.

When it comes to vehicle classification, it is rarely clear how the vehicle is defined according to the law. In some cases, retailers use their own terms, such as "Light Electric Vehicle," which is not found in official legislation. This lack of clarity is problematic, as the vehicle's legal classification determines where and how it may be used and what rules apply. Retailers are obligated to inform customers about vehicle classification and usage, in line with the requirements of the Swedish Marketing Act (2008:486).

3.3 The Web: The Most Common Channel for Purchase and Information

According to both of our web surveys, more than half of all respondents conducted online searches before purchasing their electric single-person vehicle. Around 40 percent visited online stores prior to making their purchase. Far fewer — just under one-quarter of respondents in the household survey and one-fifth in the individual survey — visited physical stores. More than half of the vehicles were purchased from an online retailer, according to both surveys. Significantly fewer respondents stated that they bought their vehicle in a physical store, with 32 percent of respondents in the household survey and 23 percent in the individual survey indicating this.

According to the retailers we spoke with, the most common consumer questions concern the performance of electric single-person vehicles, such as range, power, speed, and charging time, as well as overall value for money. Questions about accessories like helmets or locks are rare. Our web surveys of households and individuals align well with the retailers' descriptions of what consumers look for in product features. The survey results also show that information about range, motor power, durability, and speed are the characteristics consumers most frequently seek out. There was less interest in understanding the laws and regulations governing electric scooters. Just over half of the respondents in the household survey and slightly less than half of the respondents in the individual survey actively sought information about applicable laws and regulations before making their purchase. Many users were unsure about the legal usage of their vehicles. An analysis based on our classification of vehicles according to the Road Traffic Definitions Act shows that only a relatively small proportion of users have a correct understanding of how their vehicle may be operated. Also, few have taken note of the recent changes in the Traffic Damage Act. In addition, many respondents' express uncertainty about insurance requirements and what coverage applies to their electric single-person vehicle.

3.4 Electric Scooters Dominate Private Ownership

The results from the household survey show that a clear majority (75 percent) of the households included in the study, all of which own some type of electric single-person vehicle, own an electric scooter. Nearly one-fifth of these households (17 percent) own two or more electric scooters. All respondents in the individual survey own at least one electric scooter, with half of them owning two or more. Very few individuals own any other type of electric single-person vehicle besides an electric scooter.

In the household survey, the majority of vehicles have a maximum speed of 20 to 25 kilometers per hour, accounting for 70 percent. In the individual survey, this share is only 33 percent. Almost half (46 percent) of individual survey respondents report that their vehicle has a top speed of over 25 kilometers per hour but no more than 45 kilometers per hour, and one-fifth state that they own vehicles capable of exceeding 45 kilometers per hour. Regarding the power of the electric single-person vehicles, the survey results show that relatively few respondents in both surveys report that their vehicles are limited to 250 watts. About one-quarter (26 percent) of the vehicles in the household survey have a power rating between 0 and 250 watts.

In the household survey, one in three respondents does not know the power of their vehicle.

According to our household survey, one-quarter of the users of privately owned electric single-person vehicles are under 18 years of age, and one in five users is under 15. The largest user group among those under 18 consists of children aged 10 to 14, making up 16 percent of all users. More than half of the vehicles used by this age group correspond to either moped class II or moped class I under the Road Traffic Definitions Act. This means they are using vehicles they are not legally permitted to operate, as riding a class II moped requires being at least 15 years old and holding a driving certificate, and operating a class I moped requires an AM driver's license.

3.5 Usage Patterns and User Behaviour

The use of electric single-person vehicles is strongly seasonal. Usage increases during the spring, peaks in the summer, declines in the autumn, and remains relatively low during the winter. When asking respondents in the household survey about the types of trips their vehicle is primarily used for and how often, trips for running errands emerged as the most common type of use. However, trips to and from leisure activities or using the vehicle simply for fun were almost equally common. Eighteen percent stated that they use the vehicle for daily commuting to and from school or work, where the vehicle is used for most or all of the distance. The least common use is for work-related travel (see fig. 2).

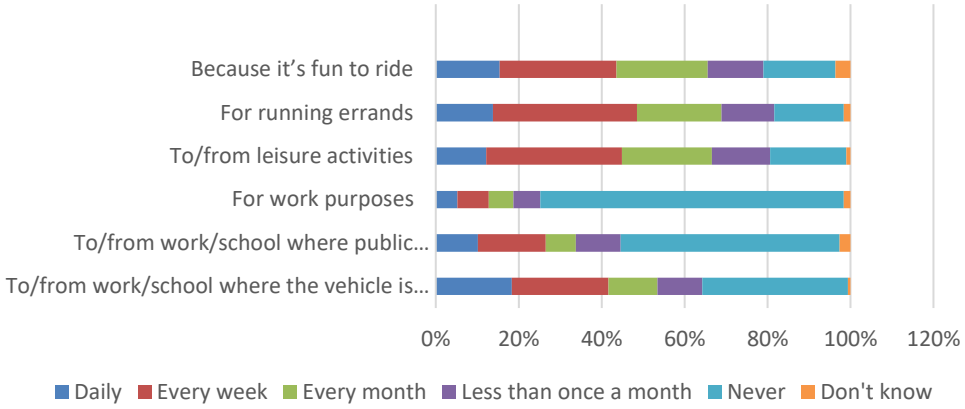

Fig. 2. For what types of trips is the vehicle used? Percentage of respondents by trip type.
Note: Refers to the household survey, n=305. Multiple responses possible.

If we take a closer look at younger users under the age of 18, we find that more than half (56 percent) use the vehicles daily or weekly simply because they find it fun to ride. Nearly half use the vehicles for running errands (47 percent) or traveling to and from leisure activities (45 percent). Almost one-third, 30 percent, commute to school daily or weekly, using the vehicle for most or all of the distance. As previously reported, 16 percent of electric single-person vehicle users in the household survey are between 11 and 14 years old. Among all respondents under 18, it is this age group (11–14) that uses the vehicles the most.

The majority of trips made with electric single-person vehicles are between 1 and 5 kilometers round trip. In the household survey, trips between 1 and 3 kilometers are the most common. This distance is the most frequent for all types of trips, except for commuting to and from work or school where public transport is used for most of the journey.

According to both of our web surveys, men tend to make longer and more frequent trips than women. Men also use the vehicles more often for recreational purposes. There are no significant differences in trip length when breaking down the results by age or income groups. Respondents in the household survey who use fat scooters make longer trips compared to those using other types of electric single-person vehicles. Users of Air Wheels, e-skateboards, or fat scooters travel less frequently than the large group of electric scooter users. Additionally, the group with the lowest household income tends to use electric scooters slightly more frequently than other income groups for all types of trips.

In response to our question about which modes of transport are being replaced by electric single-person vehicles, the household survey shows that cars, walking, and bicycles are most commonly replaced. Cars are primarily replaced for trips related to running errands and traveling to and from leisure activities, where 35 percent of such trips are now made using an electric single-person vehicle (see fig. 3). In the individual survey, respondents reported replacing car use in more than half of their trips for leisure activities, errands, and work-related travel.

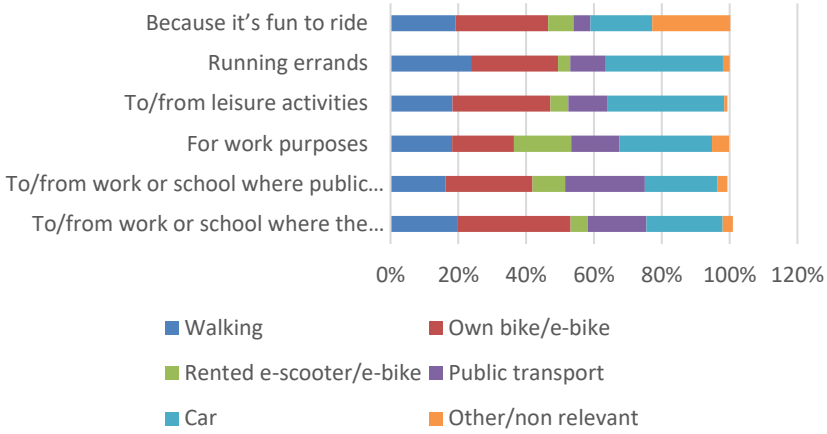

Fig. 3. If the electric single-person vehicle had not been used, which mode of transport would typically have been used instead for these trips? Percentage of users by trip purpose and type of transport mode. Note: Based on the household survey. Multiple responses possible. The number of respondents (n) varies depending on how many indicated that the vehicle is used for each trip purpose.

3.6 Shared Electric Scooters - From Rapid Expansion to Sustainable Operation

The introduction of electric scooters in Sweden began in 2018 in Stockholm and quickly spread to other Swedish cities during late 2018 and early 2019. In the following years, the number of micromobility companies and shared electric scooters grew rapidly. By 2020, ten micromobility companies were operating in major cities such as Stockholm, Gothenburg, Malmö, Uppsala, Lund, Helsingborg, and Västerås. During these early years, companies focused on rapid expansion to capture market share in a fast-growing sector, financed by venture capital and business models that prioritized expected future value over short-term profitability.

This rapid growth, however, was met with significant public resistance. Shared electric scooters were frequently parked carelessly, blocking sidewalks and public spaces, and in some cases were even vandalized or thrown into waterways. In response to these challenges, both national and municipal regulatory changes were introduced. Combined with a general economic downturn, several micromobility companies exited the Swedish market in 2022 and 2023. The number of rented e-scooters decreased from approximately 45,000 in 2021 to around 30,000 in 2024. According to interviews, media reports, and Transport Analysis' municipal survey, many municipalities have observed improvements in order and compliance, particularly in parking behaviour. Several municipalities have even expressed a desire to maintain the current number of shared electric scooters.

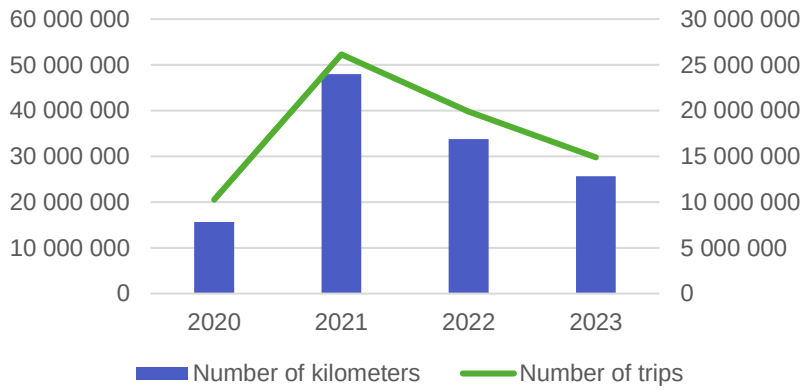

Fig 2. The number of trips and distance traveled (in millions of kilometers) with shared electric scooters from 2020 to 2023. (Number of trips on the left axis and distance on the right axis). Source: NMA. Data collected from Bolt, Bird, Lime, Tier, and Voi (Superpedestrian in 2021) in the cities of Gothenburg, Malmö, and Stockholm.

4. Effects of a Changing Market

The rapid growth of privately owned electric single-person vehicles has resulted in a wide range of societal impacts. This chapter summarizes the main consequences related to accessibility, public health, climate, interaction in public spaces, and accident trends, based on our own empirical data and findings from previous research.

4.1 Accessibility

The main advantage of electric scooters is that they increase accessibility for users. Those who choose to travel by private electric scooter do so because it is considered the most attractive mode of transport in the given situation. In making this choice, travellers consider factors such as the purpose of the trip, travel time, cost, comfort, time of day, and parking availability. Research shows that users of private electric scooters generally travel longer distances and use them more frequently for commuting to work, and less for errands and leisure activities, compared to rental users. One possible explanation for the longer travel distances is precisely that private electric scooters are more often used for commuting. As mentioned, several factors influence the choice of travel mode. Many studies focus on the perceived advantages of shared electric scooters, with users highlighting speed, flexibility, and the fun aspect of riding[5]. However, the factors influencing why people choose to travel by privately owned electric scooters are less explored[6].

4.2 Public Health Effects

Several studies have shown that the public health impacts of increased use of electric scooters are difficult to quantify. On one hand, greater mobility and accessibility can contribute to improved well-being and a richer social life. Many users also report using electric scooters simply for fun, which may substitute more sedentary behaviors and offer some physical and mental benefits. However, research also indicates that electric scooter trips often replace more active modes of transport, such as walking and cycling, rather than car travel. Our own household survey confirms that electric scooters frequently replace active travel modes, especially when including public transportation, which often involves walking.[1] This substitution effect may be most significant among young users — the largest user group — who are also at the highest risk of accidents. A Norwegian study has shown that young people aged 13 to 22 may lose approximately two minutes of moderate physical activity per day with frequent electric scooter use. While this may seem minor for the average population, it can represent a significant reduction for individuals who are otherwise physically inactive[7]. Another growing concern is the increase in fires linked to electric scooters and other battery-powered vehicles. Between 2018 and 2023, there were 128 reported fires involving electric scooters and 73 involving hoverboards in Sweden, most of which occurred during charging. This has led some workplaces to implement special regulations for charging electric scooters and e-bikes, raising concerns that such restrictions may discourage commuting by these modes[8]. In conclusion, the use of electric single-person vehicles brings both positive and negative public health effects. Further research is needed to fully understand and quantify these combined impacts.

4.3 Environmental Impact and Climate Potential

The climate benefits of electric scooters have been questioned, mainly due to short vehicle lifespans, emissions from fleet management for shared scooters, and the fact that only a small share of trips replace car travel[9]. Recent studies show that the life-cycle climate impact of privately owned e-scooters has not decreased between 2020 and 2024, while shared e-scooters have reduced their climate impact through longer lifespans and swappable batteries. Despite this, private e-scooters still have a lower climate impact than shared ones, as shared micromobility requires additional resources for maintenance, battery replacement, charging, and vehicle relocation[10].

Access to e-scooters may reduce the need for car ownership. For example, a study from Oslo found that 5 percent of shared e-scooter users had given up their car, and 14 percent said it reduced their need for an additional car. Although we have not studied this effect for private e-scooters, our survey data suggest that a relatively large number of trips replace car journeys. Private e-scooters also tend to replace car and bike trips more than walking trips and are generally used for longer distances compared to shared e-scooters[5].

Combined with their lower life-cycle climate impact, this suggests that private e-scooters may have greater potential to reduce carbon emissions than shared e-scooters. However, the overall climate effect depends on many factors, including whether this potential translates into actual reductions[5]. Furthermore, the car trips replaced are often short and represent only a small share of total car travel in Sweden[11].

Shared e-scooters also create problems with parking and littering, including vehicles ending up in waterways. These vehicles contain metals, plastics, and hazardous lithium-ion batteries.
Such environmental issues are likely less common with private e-scooters, as owners are more likely to care for their vehicles. However, theft could lead to similar problems, as privately owned scooters are difficult to secure and are attractive targets for theft.

4.4 Interaction and Congestion

The use of electric scooters presents challenges not only in terms of accident risk for the rider but also regarding interactions with other road users. Pedestrians, especially those with mobility or visual impairments, may face difficulties with accessibility. Studies show that motorists and pedestrians feel less safe and more frustrated when interacting with cyclists and e-scooter riders, with women and older individuals reporting higher levels of discomfort. A common issue is riders suddenly appearing from behind pedestrians, creating a sense of insecurity. Low awareness of traffic rules for e-scooter users likely adds to this tension[12].

Norwegian studies indicate that non-users in Oslo perceive poor parking behaviour and increased obstruction from e-scooters[5][12]. However, those who use e-scooters themselves tend to be more tolerant[13]. Public transport representatives express concern about private e-scooters onboard, fearing congestion and safety risks for passengers. While Swedish operators like SJ (Swedish national rail operator), SL (Stockholm Public Transport), and Västtrafik (Public transport operator in western Sweden) currently allow private e-scooters with certain restrictions, they have seen few problems so far. Still, if the use of private electric single-person vehicles continues to grow without regulation, these negative impacts are likely to increase.

4.5 Accident Trends

Accident data from Sweden's national accident database, Strada, indicate a sharp rise in electric scooter-related incidents (see fig. 4), particularly among younger users. The data reveal that a significant proportion of injuries involve privately owned scooters. Common accident causes include lack of protective gear, poor road conditions, and limited awareness of traffic rules. Among the most common injury patterns are head trauma, fractures, and abrasions, often due to high-speed collisions or loss of control[14].

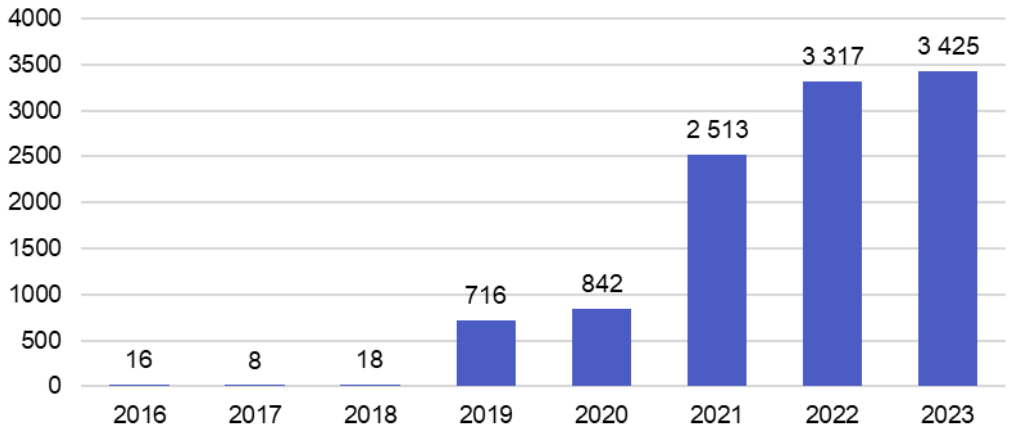

Fig. 4. Number of accidents involving electric scooters per year, 2016–2023. Source: Strada, processed by Transport Analysis

The most commonly cited causes of accidents are issues related to the road surface, misjudgements while riding, or limited visibility. A previous Strada study conducted by the Swedish Transport Agency shows that deficiencies in infrastructure, as well as maintenance and operations—particularly in single-vehicle accidents—are common contributing factors. These include curb edges and other design elements, as well as uneven or slippery surfaces[14]. The share of young people involved in electric scooter accidents has increased between 2018 and 2023. In 2019, 9 percent of those injured in electric scooter accidents were under 18 years old; by 2023, this figure had risen to 25 percent[14]. More men than women have been injured in electric scooter accidents during the period 2016–2023, and this trend is consistent across all age groups. This is linked to the fact that more men than women use electric scooters. The majority of accidents occur on pedestrian and bicycle paths, although a significant number also happen on roads used by cars. Single-vehicle accidents have dominated the statistics in 2022 and 2023[14]. The sharp increase in the number of accidents is most likely due to the growing use of both privately owned and rented electric scooters. We can also observe that these accidents have become more widespread across the country[15].

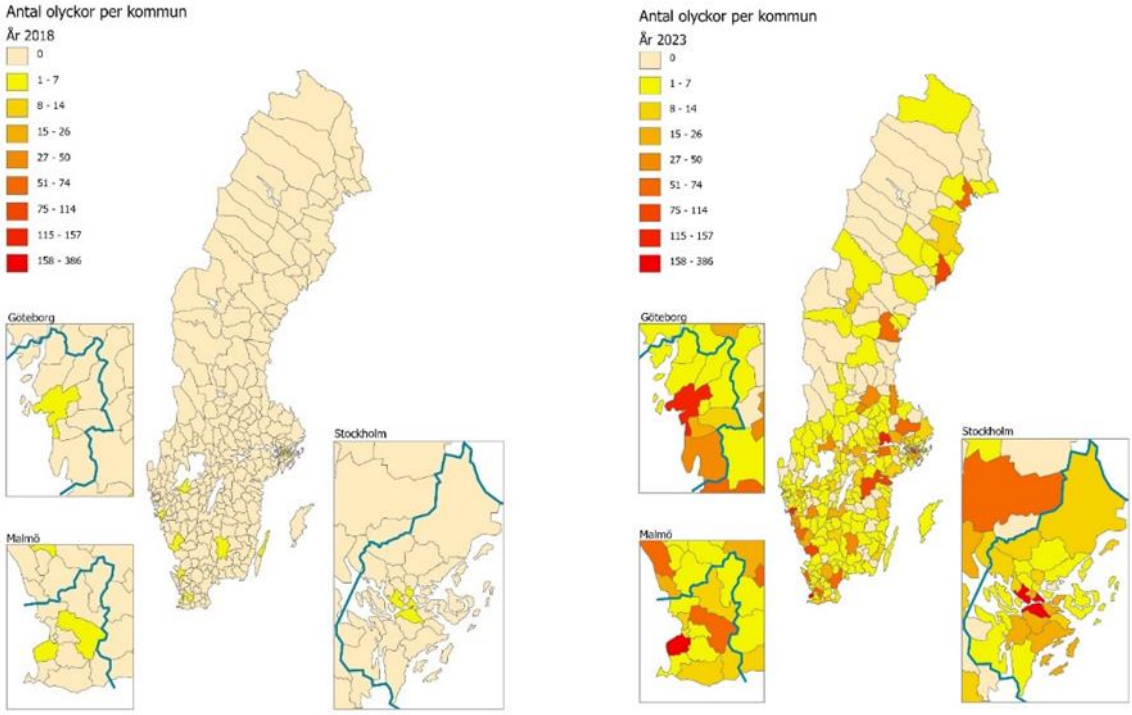

Fig. 5. Map of the number of accidents involving electric scooters per municipality, years 2018 (left) and 2023 (right). Source: Strada, processed by Transport Analysis

In Strada, it is rarely possible to distinguish between accidents involving privately owned or rented electric scooters. To estimate the share of accidents with privately owned scooters, we analysed statistics from municipalities with and without rental services in 2023. The results indicate that at least 37 percent of accidents occurred in municipalities without rental services, suggesting a significant portion involved privately owned vehicles. This share is likely even higher, as privately owned scooters are also used in municipalities with rental services. Additionally, there were notable differences in the age distribution of those injured. In municipalities without rental services, 26 percent of injured riders were between 7 and 14 years old, compared to 13 percent in rental municipalities, while the share of injured riders aged 20–34 was 42 percent in rental municipalities and 28 percent elsewhere. A possible explanation is that privately owned vehicles lack the age restrictions imposed by rental services, though the exact extent to which rental scooters contribute to accidents remains uncertain[15].

5. Legal Ambiguities

Our analysis shows that the legislation regarding electric single-person vehicles is complex, making it unclear and difficult to interpret — even for authorities. This complexity arises from rapid technological development and the fact that these vehicles do not fit neatly into existing legal categories. As a result, varying interpretations of the law have spread in society, creating confusion about what regulations actually apply.

5.1 Retailers face difficulties in informing consumers

Several retailers we interviewed expressed a desire to inform their customers about current regulations, and they are also legally required to do so under Swedish marketing law. However, they experience the guidance from authorities, particularly the Swedish Transport Agency, as unclear and difficult to interpret. Retailers call for more active and clearer communication from authorities, as well as simpler legislation better adapted to market realities. Many retailers feel pressured to sell more powerful vehicles to remain competitive, as consumers demand vehicles capable of handling tasks such as riding uphill — often requiring higher power output than allowed under current bicycle classification rules. Retailers also emphasize the need for predictable and clear regulatory frameworks for technical performance and vehicle classification.

5.2 Lack of awareness among buyers and users

The absence of clear information from both authorities and retailers means that users and parents buying vehicles for their underage children lack the knowledge they are legally responsible for having. This results in low awareness of the risks buyers expose their children, themselves, and others to. We have, for example, identified households owning scooters with performance levels corresponding to mopeds, where the primary user is under 15 years old. Allowing a child to operate such a vehicle without proper authorization could result in fines for “permitting unauthorized driving”. Respondents to our surveys expressed frustration with unclear rules — some view the regulations as too restrictive, while others are annoyed by reckless riders who create problems for responsible users.

5.3 Challenges for law enforcement

Police officers face difficulties when attempting to verify what type of vehicle has been used in suspected traffic offenses. Determining whether a vehicle is classified as a bicycle, moped, or other vehicle is often unclear. According to the Machinery Directive, power output should be clearly displayed on the vehicle. However, definitions in Swedish traffic law refer to net power or continuous rated power, both of which are difficult to measure in practice. The police therefore often rely on manufacturer markings. While some vehicles are seized and tested using dynamometers, these are not suitable for electric scooters due to their small wheels. Police officers we spoke with noted that measuring the vehicle’s speed, either through laser speed checks or test rides, is often the easiest way to assess classification. In some regions, drones are used to monitor and act against illegally modified vehicles. However, the current definition of a bicycle is perceived as confusing, and not all police officers have the opportunity to familiarize themselves with the complex rules. This creates a risk of inconsistent enforcement across the country. Generally, enforcement against electric single-person vehicles depends on available time, resources, and the situation at hand — meaning those who ride calmly and responsibly are less likely to face penalties for violations.

5.4 Clearer rules for shared e-scooters

In contrast, the market for shared electric scooters is far more straightforward, as these vehicles are clearly classified as bicycles and fall outside the legal grey zone affecting privately owned vehicles. Additionally, shared scooter operators provide clear information on how their vehicles may be used, both on their websites and in their apps.

6. Policy Recommendations

To ensure the safe and sustainable integration of electric single-person vehicles into Sweden's transport system, we recommend a series of targeted policy measures:

- *Harmonized and Clear Public Information*

Authorities should collaborate to provide unified and accessible information about how electric single-person vehicles may be used and what legal requirements apply. The information should be aimed at both retailers and users, with a focus on increasing knowledge about insurance obligations, legal definitions, and the risks associated with misuse. Authorities that need to be involved primarily include the Swedish Transport Agency, the Swedish Prosecution Authority, the Swedish Police Authority, and the Swedish Consumer Agency.

- *Evaluation of the New Insurance Requirement*

The recent amendment to the Traffic Damage Act introduces mandatory insurance for certain types of electric single-person vehicles. There is a need for close monitoring of how this is implemented and understood by users. It should be evaluated whether vehicles requiring insurance should also be subject to registration in the future.

- *Clarification of Legal Definitions*

The current legal definitions are difficult to interpret, even for authorities and law enforcement. There is a need to clarify and possibly simplify definitions and classifications to provide a more predictable and transparent legal framework for both users and sellers.

- *Continued Monitoring and Knowledge Development*

Further follow-up of the market development, usage, and consequences of electric single-person vehicles is necessary. This includes continued mapping of vehicle types and performance, user behaviour, and accident trends. Coordination between relevant authorities, such as the Swedish Transport Agency, Trafikanalys, and The Swedish Agency for Growth Policy Analysis, is crucial for ensuring a knowledge-based and proportionate regulatory development.

7. Conclusion

Privately owned electric scooters have become an increasingly common means of transport in Sweden, offering flexible mobility and improved accessibility, particularly for short-distance travel. However, the rapid market growth and technological development have outpaced existing legislation, leading to regulatory ambiguities and a lack of consumer awareness.

This study highlights the need for clearer regulations and harmonized public information to ensure that users understand how their vehicles may be operated, what legal requirements apply, and what risks are associated with their use. Improved communication from authorities and retailers is essential to support safe and lawful usage, particularly among young users.

While electric scooters offer mobility benefits, their integration into the transport system requires continued monitoring and coordination between national and local actors. Clarifying legal classifications and improving user knowledge are key steps to addressing the challenges identified in this report.

References

[1] Transport Analysis, *Användning, marknad och konsekvenser av elsparkcyklar och andra eldrivna enpersonsfordon*, Rapport 2024:7, 2024.

[2] Swedish Transport Agency, Swedish Traffic Accident Data Acquisition (Strada), 2024. Available at: https://www.transportstyrelsen.se (accessed: April 3, 2025).

[3] Swedish Transport Agency, *Elsparkcykel*. Available at: https://www.transportstyrelsen.se (accessed: April 3, 2025).

[4] European Parliament and Council, *Regulation (EU) No 168/2013 on the approval and market surveillance of two- or three-wheel vehicles and quadricycles*, 2013.

[5] TØI, *E-scooters in Norway: Main results from two web-surveys autumn 2021*. TØI Report 1889/2022, 2022.

[6] Roig-Costa, O., et al., *Shared bikes vs. private e-scooters: Understanding patterns of use and demand in a policy-constrained micromobility environment*. Transport Policy, 146, 116-125, 2024.

[7] TØI, *Public health consequences of electric scooters for young people and adults: Effects on active mobility and accidents – Summary*. TØI Report 1898/2022, 2022.

[8] MSB, *Sammanställning av bränder i elfordon och eltransportmedel år 2018–2023*, 2023.

[9] TØI, *Shared e-scooters in Oslo – Summary*. TØI Report 1748/2020, 2020.

[10] ITF, *Greener Micromobility*. International Transport Forum Policy Papers, No. 131, OECD Publishing, Paris, 2024.

[11] Oeschger, J., et al., *Investigating the role of micromobility for first- and last-mile connections to public transport.* Journal of Cycling and Micromobility Research, 2023.

[12] TØI, *The joy and trouble with e-scooters – Summary*. TØI Report 1828/2021, 2021.

[13] Karlsen, T., et al., *E-scooters' Impact on Accessibility for People with Visual Impairment or Impaired Mobility in Urban Areas in Norway*. Environmental Science, Geography, Sociology, 2023.

[14] Transport Analysisy, *Antal skadade i olyckor med elsparkcykel ökar kraftigt. Sammanställd statistik från polis- och sjukvårdsrapporterade olyckor i Strada*, 2023

[15] Transport Analysis, *Trafikolyckor med elsparkcyklar– en djupdykning i Strada*, PM: 2024:10, 2024

Presenter Biography

Hans Lindh ten Berg holds a Master's degree in Public Policy and Organization from Stockholm University. He is an expert in evaluation and analysis at Transport Analysis, Sweden's national agency for transport analysis. His work focuses on sustainable mobility, micromobility trends, and policy development. Hans has extensive experience in evaluating national transport policy, with a particular focus on sustainability, regulatory frameworks and impact assessments. He has conducted multiple assessments of freight transport systems, including their environmental impact, efficiency, and governance structures. He has contributed to several governmental studies on urban mobility, transport safety, and freight logistics.