Data and Perspectives on E-Scooters use in Mediterranean Cities

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Abstract

The issue of micromobility has been raised suddenly in recent years and although it includes several transportation modes, in shared or private form, shared e-scooters have become the fastest growing trend. While private e-scooters have been on the market for decades, the phenomenon of the shared e-scooter systems emerged mainly due to the advances of innovative technologies. However, the main question today is how e-scooters could be integrated into the urban environment of cities in terms of environmental, economic, and social performance, especially towards providing better first/last/only-mile connectivity. The answer is not simple because their sustainability in relation to the mobility system is mainly determined by how they are used and what they replace. If an e-scooter trip replaces a motorcycle or a car trip, the environmental and health effects are positive. If it replaces a trip on foot or by bike, the situation gets worse. This paper gives an overview of e-scooters' use in Mediterranean cities, presents some preliminary results of a relevant ongoing quantitative survey in Greece, and offers a discussion on available data, challenges, and perspectives. The rides of shared e-scooters in several Mediterranean cities have overcome the one (1) million in just 10-12 months after their availability, while private e-scooter market shows also a growing demand. Given that this new mode of transport is still in its infancy, in this paper we examine the first indications in regard to its necessity, attractiveness, safety, cost, people's attitudes, and integration into the urban environment focusing on Mediterranean cities.

1. Introduction

Air and noise pollution, traffic congestion, and long commuting times are some of the transport-related issues in cities that deteriorate the quality of life (United Nations Human Settlements Programme [UN-Habitat], 2016; European Commission, 2019a). A decrease in ownership of private vehicles in favour of efficient and connected public transport modes, improved walking and bicycling infrastructure, congestion charges and shared mobility could substantially ease these problems and facilitate cities towards establishing sustainable mobility conditions (United Nations, 2017; European Commission, 2019b, 2019c). The changing of urban policies towards sustainability in Mediterranean cities is a process that has started long ago (Antoine, 2002), gradually evolving them into a sustaining and sustainable habitat (Vanderburg, 2004). In this frame, the role of public transport and tethered vehicles (Dahlström, 2002; Gilbert, 2004) and the promotion of innovation in this field (Tsafarakis et al., 2019; Nalmpantis, Roukouni, Genitsaris, Stamelou, & Naniopoulos 2019) is crucial, while active and non-motorized mobility is expected to have an even more important role to play in cities in the future (Havlick, 2004).

Towards these goals, the issue of micromobility, as defined by Brunner, Hirz, Hirschberg, and Fallast (2018), or "shared micro-mobility" (Shaheen & Cohen, 2019), has been raised suddenly in recent years in the urban transport sector, allowing e.g. pedal bikes, e-bikes, and e-scooters to enter in the cities on a "large" scale. Although micromobility includes several different service models and travel modes, in a shared or personal form (e.g., bicycles, skateboards, kick scooters, segways, hoverboards, etc.), shared electric scooters have become the fastest growing micromobility mode since their introduction, three years ago (Institute for Transportation and Development Policy [ITDP], 2019). While personal e-scooters have been on the market for decades, the phenomenon of shared e-scooter systems emerged mainly due to the advances of innovative technologies (e.g., improved battery technology, smartphones, Global Positioning System [GPS], mobile payment systems, etc.). According to Giannopoulos and Munro (2019), "technological revolutions can produce permanent structural changes in how societies and economies function, operate, and collaborate domestically and internationally and envision the future". The question and research today focus on how these electric kick scooters could be integrated into the urban environment of cities in terms of environmental, economic, and social performance.

In the context of this paper, recent data on e-scooters use in European Mediterranean cities are presented and discussed, also highlighting the relevant challenges and perspectives. In the second chapter, the methods used are presented. Next, in the third chapter, there are results and discussion. In the fourth and final chapter, conclusions are drawn and directions for further research are proposed.

2. Methodology

The data and the results in this paper derive mainly from the international literature (e.g., journals, books, conference and seminar proceedings, scientific and business reports, regulatory and legislative framework) including web resources, such as online texts, news and announcements published in newspapers, television and radio shows, and shared e-scooters providers' websites.

Moreover, some preliminary data from an ongoing quantitative survey of dockless and personal e-scooter users in the city of Thessaloniki, Greece, conducted in the frame of an undergraduate thesis in the School of Civil Engineering of the Aristotle University of Thessaloniki (AUTh), are indicatively presented. The survey is

conducted with the use of an online questionnaire and a series of personal interviews with e-scooter users aiming to identify their profile, outline the uses of e-scooters, and understand and register the challenges and impacts of this transport mode on urban mobility practices. Before the dissemination of the survey, some exploratory interviews have been conducted with current users for providing a first point of view on how the survey's issues were perceived by them and forming the construction of the questionnaire. The online questionnaire is disseminated and promoted via social networks (e.g. Facebook) and e-mailing to specific e-mail addresses, while interviews with users are being conducted on docking points around the city, at different times of the day (morning, midday, and afternoon) and during all the days of the week, when the users intend to rent an e-scooter. The personal interviews were selected for allowing the verification and elaboration on various assumptions formulated after the analysis of the responses. In this frame, the questions comprise various topics such as who are the e-scooters users, the frequency of use, the obstacles and motivation on their use, where the users ride, how users react on several regulatory perspectives if trips are taken collectively or individually, the degree of modal shift, and trips that favour intermodal practices.

So far, 135 user responses have been collected and 29 semi-structured interviews with e-scooter users have been conducted. The aim is to gather about 400 responses from different users, so as to obtain a representative sample and keep the confidence level at 95% and the confidence interval equal to 5 (given that the city's population is about 1.000.000 people). To the best of our knowledge, no published questionnaire survey on the issue has been conducted in Greece so far.

All information mentioned in this paper regarding the stand-up e-scooter and not the e-scooter on which the driver sits, both in docked and dockless schemes.

3. Results and Discussion

The inhabitants of Thessaloniki, Greece, were the first residents of a Mediterranean city to have the opportunity to travel around the city on rented dockless e-scooters of Neutron Holdings Inc., known as Lime, since 2018 (Kokkinidis, 2018), while during the same year similar rental services began to be implemented in other Mediterranean countries such as France, Spain, and Portugal. Cyprus, Italy, Malta, and Slovenia followed in 2019, however, such a sharing system has not been recorded so far in other European Mediterranean countries (e.g., Croatia, Albania, Monaco, Montenegro, and Bosnia and Herzegovina). Following e-scooter sharing systems furious spring and growing popularity worldwide, some recent posts report that sharing providers are retreating from certain cities' markets and laying off staff, looking for profitability, survival, and consolidation (e.g., Buckley, 2019; Bliss, 2020; McFarland, 2020). For example, in Greece, Hive, one of the largest e-scooter companies, announced in February 2020, a year after its arrival in the Greek market, that it decided not to continue its services due to "the absence of an integrated legal framework that creates an organized business environment" (Skiannis, 2020a). The reasoning of Hive's decision expresses the present situation in many countries around the world where e-scooter providers, planners, residents, and decision-makers are not yet ready enough to manage efficiently the challenges and considerations of the boom of this type of micromobility. Similarly, in Spain, Betancourt (2020) indicates that e-scooter companies failed in their first year (2019) in Spain, mentioning also that 11 providers have left the country or stopped operating.

Do Mediterranean cities need e-scooters?

According to the "Mobility for nearly zero CO2 in Mediterranean tourism destinations" (MOBILITAS) project, rapid urbanization and heavy reliance on the use of conventionally fuelled private cars, make many Mediterranean cities today to face, among other challenges, congestion, noise and air pollution, and inadequacy of public transport (MOBILITAS, 2019). Furthermore, their exposure to the impacts of touristic seasonality adds up pressure on the need to plan for accessible, sustainable, and effective mobility transport modes. In Europe, approximately 50-60% of car traffic volume is caused by cars on trips less than eight km and vehicle traffic speeds in many city centers are averaging as little as 15 km per hour (Heineke, Kloss, Scurtu & Weig, 2019). According to the European Commission (2017), the average driver in Greece spent more than 36 hours in traffic congestion in 2017, in Italy more than 37 hours, in Cyprus more than 35 hours, and in France more than 30 hours.

In fact, as short-distance car trips account for a large share of motorized travel and public transport networks cannot make door-to-door trips, micromobility, in general, can be a key piece of an efficient transport system. This possibility has been also identified by the European Environment Agency (2019), which included e-scooters in the modes that can give solutions in the first and last mile of each trip, mainly by replacing a car or taxi trip. Available data for France (Paris, Lyon, and Marseille) show this proportion to be 8-10% (6t, 2019a, 2019b), while for Portugal (Lisbon) the figure increases up to 21% (Lime, 2018a). We may assume that in a city with very low car use, it is only natural that a very small fraction of e-scooter trips replace car trips. Although the large cities attract the attention of the various policies and media, Mediterranean small and medium-sized cities may face also similar challenges, e.g., in cases they have surrounding suburbs with big service gaps, intense tourism flows or they are very car-dependent. For example, in Greece, traffic congestion concerns not only the two largest cities of Athens and Thessaloniki but also the small and medium-sized ones (see Milakis, 2015; Giannoulis, 2019; Kordos, 2019). It should be also highlighted that the Mediterranean climate minimizes the sensitivity and limitations of e-scooters' use to weather conditions, unlike other European cities that generally have more rainy and cold days (Hardt & Bogenberger, 2019; Chang, Miranda-Moreno, Clewlow, & Sun, 2019).

If someone asks whether Mediterranean cities want e-scooters, the answer depends on about which city he/she asks. In general, e-scooters, electric bikes, and pedal bikes, either docked or dockless, if introduced properly, can be a transport alternative (e.g. for the first/last/only-mile option) to the car for distances of up to several km and alleviate some of the transport challenges that cities and their residents face. The main concerns with micromobility

vehicles, and e-scooters in particular, are safety and whether cities' infrastructure and regulations can support the mass inflow of these modes of transportation. In any case, cities and e-scooter providers can work together to shape a way ahead that serves the public good, meets cities' goals, and enables providers of the private sector to establish viable business models. Collaboration among all stakeholders seems to be the way to go.

Do users favour e-scooters or other micromobility modes?

Although shared bicycle usage is still worldwide the most common way to get around (National Association of City Transportation Officials [NACTO], 2019), shared e-scooters in the USA overtook bicycles as the preferred vehicle for dockless vendors (Moore, 2019). This dynamic seems to be similar for several Mediterranean cities where shared e-scooters have been developed, taking into account the number of shared e-scooters rides announced only by Lime through its website: e.g. Greek and Spanish users have taken more than one million rides on Lime e-scooters after just 12 months (Lime, 2019a), Parisians took one million rides in just 120 days (Lime, 2018b), and Portuguese took more than 1.8 million rides in one year (Lime, 2019b). Specific data regarding the Greek e-scooter (shared and personal ones) market seems to confirm the aforementioned trend and demonstrate a strongly positive acceptance by customers and users. According to Skiannis (2019), there are currently around 4,000 e-scooters to be rented in Athens, Thessaloniki, and Crete, but the owned ones have surpassed this figure. Their sales began practically from zero in 2018 to reach around 4,000 by the end of that year, but positive user experiences have resulted in a "boom" of sales in 2019 when a total of 20,000 e-scooters are estimated to have been sold (Skiannis, 2019).

Considering e-scooters' popularity and market potential and since they address cities' sustainable mobility goals (e.g., reducing congestion, pollution, and private car use; complementing public transport; expanding access for underserved areas; etc.) this form of micromobility should be welcomed, despite the fact that it was introduced without consultation with local authorities and citizens. On the other hand, e-scooter users should show respect to other road users, and particularly to the vulnerable ones, by riding in regulated lanes, being sober, keeping speed limits and other traffic rules, parking in designated areas, wearing helmets, etc.

Is micro mobility safe?

The safety of both e-scooter users and other road users is another key concern in cities. Scientific publications and media accounts show cases of e-scooter riders being injured or injuring others, highlighting also an increasing rate of these kinds of accidents (Bekhit, Le Fevre, & Bergin, 2020; Namiri et al., 2020), but it is still unclear how dangerous they are compared to other transport modes and whether their use can create a gain for public health services by reducing car or motorcycle-based trips. Information from media reports of standing e-scooter fatalities show that at least 29 people have died in e-scooter crashes since 2018 worldwide (Griswold, 2020), while in Mediterranean countries, up until the end of 2019, there were six (6) e-scooter related deaths in France, five (5) in Spain (International Transport Forum [ITF], 2020), and one (1) in Greece (Politis, 2019), as well as a dozen of accidents with injuries for both users and pedestrians.

Considering that e-scooters have been on the streets for a limited time, relevant accidents will probably decline supposing that riders will become more familiar with e-scooters and stricter safety rules will be enforced both by the providers and national or local authorities (e.g. helmet requirement, speed limits, fines, dedicated corridors, etc.). In this frame, according to ITF (2020), the risk of a fatal traffic accident is as great on an e-scooter as on a bicycle, while motor vehicles are involved in about 80% of fatal accidents that occur with cyclists and e-scooter users. Thus, current data do not provide clear evidence of safety being a crucial concern for e-scooters use in Mediterranean cities.
However, besides the providers', cities', and national regulations, users have much more to do apart from just wearing a helmet. Users should ride carefully, without a passenger, not under the influence, and leave the scooter standing up and out of the way of pedestrians, people with disability, and road traffic, while initially they should have done a visual inspection, as well as perform a pre-ride check for damages and take a test-ride in case they are novice riders.

Is micro mobility economically advantageous?

Shared e-scooters in almost all European countries unlock for €1.0 and there is an additional charge of €0.15 for each minute of use. Thus, a ride of 10 minutes will cost €2.50. Assuming a mean velocity of 15 km/h, this cost corresponds to a route of 2.5 km length. Obviously, this is costlier in comparison to walking and private bicycling, and, at first sight, to public transportation.

Regarding the typical regular fare of riding a public bus in the Mediterranean cities, we can assume it to be approximately €1.50, with the note that there is usually a 50% discount valid for e.g., students and the elderly. Nevertheless, the fare varies among countries and cities: e.g., €1.0 in Thessaloniki, Greece, €1.3 in Zagreb, Croatia, €1.4 in Athens, Greece, €1.5 in Rome, Italy, €1.5 in Lisbon, Portugal, €1.5 in Valletta, Malta, €1.9 in Paris, France, and €2.0 in Madrid, Spain, according to information retrieved from the Organisation of Urban Transportation of Thessaloniki (2020) for Thessaloniki, Greece, and Globalprice (2020) for the rest of the cities. These prices are hard to beat, but there are some downsides to using public buses, such as the dozens of stops, the schedule keeping, the location of the pick-up and drop-off stops, the crowdedness, and the fact that there is no adequate public transport service after the midnight in some cities (e.g., in Thessaloniki, Greece).

Is e-scooter rental more expensive than driving a car? The mileage reimbursement for a car in Mediterranean countries varies from €0.15 to €0.57 per km (Eurodev, 2019). Accepting a mean value of €0.33 per km means that for 2.5 km the cost for the average person is about €0.83, i.e., €1.67 cheaper than riding an e-scooter. However, congestion, parking costs, and car payments are variables not included in this mileage rate, which could reduce the scale.

Regarding taxi cost, e-scooter use looks quite cheaper, using, indicatively, current data from Thessaloniki,

Greece, where the minimum charge is €3.72 and the rate per km inside the city is €0.74 (O Ermis, 2020). Assuming someone makes 20 minutes of daily shared e-scooter use and given that the price of a personal reliable e-scooter in the Greek market starts approximately from €400, we can deduce that in three (3) months someone would have spent in taxis the money he/she would have spent on buying his/her own e-scooter. More or less, this should be also valid for other Mediterranean cities.

In financial terms, compared to taxis, e-scooters are always cheaper, while compared to driving a car or riding the bus, renting a scooter is probably more expensive. Nevertheless, factors such as fun and eco-friendliness can tilt the scales in favour of e-scooters. Towards awarding frequent users, some e-scooter providers offer today weekly and monthly subscription services for the unlock fee (Porter, 2019). For example, the weekly subscription service of Lime, called LimePass, is currently valid in Greece, Spain, Portugal, France, and Italy and it costs €5.99 (Skiannis, 2020b), meaning that a daily user can save €1.0 per week, as he/she will still have to pay the per-minute charge. Furthermore, some providers started recently to offer discounted rider rates to homeless or low-income people (Holman, 2019). From the cities examined in this paper, currently, this service is only available in Paris (Lime, 2019c), giving eligible participants the opportunity to save 50% or more on every Lime e-scooter ride throughout the city. In this frame, cities could require from operators to offer a) an income-based discounted payment plan to low-income customers and b) a cash-based payment plan.

What about the regulatory framework?

E-scooters were developed with legal gaps concerning their use in the urban environment, but today e-scooter sharing companies are called upon to satisfy not only their customers but also the national and local authorities. Negative publicity about e-scooters causing injuries, congesting sidewalks, discomforting pedestrians, being vandalized, and creating dangerous situations along-side traffic have driven many countries and cities worldwide to introduce and enact relevant regulations and laws (Gössling, 2020). According to media headlines for the Euro-Mediterranean region, Italy, France, Malta, and Spain have recently set specific national rules and terms on e-scooter use in urban areas, while Portugal (Perrone, 2019), Greece (Kassimi, 2019), Slovenia (Jandl & Kjuder, 2019), and Cyprus (Dimitrova, 2019) are on the way to establish relevant regulations.

In Italy, e-scooters, segways and e-vehicles (hoverboards and monowheels excluded) with a maximum power of 0.5 kW and speed below 20 km/h can circulate in urban areas and on normal roadways, like bikes, since 30 December 2019 (SmartGreen Post, 2020).

On 25 October 2019, France legalized the use of e-scooters by defining them as motorized personal movement devices, with a maximum speed limit of 25 km/h. Their users must be aged 12 or over and they can be used on cycling paths and city roads with a speed limit of 50 km/h or less, but not on footpaths, highways, and rural roads (BBC, 2019).

In December 2019, a provisional Directive from the Directorate-General for Traffic of Spain was issued for regulating the use of e-scooters in the country. This regulation set specific terms and specifications on speed limit (max 25 km/h), permitted riding areas (within 30 km/h zones, local roads, and bicycle lanes), minimum age (18 years old), fines for improper use (alcohol levels, use of headphones or mobiles, not using a helmet, riding on footpaths etc.), number of passengers (only one person per ride), and parking (in general, they should be parked in places reserved for motorcycles and bicycles) (O'Reilly, 2019).

Malta, at the end of 2019, enacted the Micromobility Regulations 2019, a detailed and structured regulatory framework for e-scooter use. The regulations introduced some novel specifications such as the one-time registration per e-scooter (each vehicle should bear a unique registration plate/sticker), the need for riders to get a relevant driving license, and the existence of a third-party risks insurance for all e-scooters. Furthermore, riders should be aged 16 or over, the maximum allowed speed on pavements is set to 10 km/hr and on urban streets and cycle paths to 20 km/hr, a helmet is not obligatory, and they may be parked on pavements or in pedestrian zones but without obstructing and restricting their prompt and safe use (The Malta Expat, 2020).

In Greece, the competent Hellenic Ministry of Infrastructure and Transport is elaborating on a new regulatory framework on the market, safety, and use of all micromobility transport modes, which is expected to be in place in the following months. According to the available information so far (Kassimi, 2019), the forthcoming legislation will characterize e-scooters as Personal Light Electric Vehicles (PLEVs) and users will be prohibited from carrying another passenger, should be over 15 years old, and should wear a helmet. Additionally, PLEVs will be further categorized according to their maximum speed as follows:

1. those with a top speed of 6 km/h (allowed to move freely in pedestrian areas),
2. those with a top speed of between 6 km/h and 25 km/h (allowed to circulate like bicycles), and
3. those exceeding 25 km/h.

In general, the aforementioned provisions follow, more or less, the arrangements set in other countries.

Although not clearly defined or foreseen in the previously mentioned regulations, we consider it appropriate to delineate the role of Mediterranean and European cities in establishing further standards and rules on e-scooter use within their jurisdictions, adapted to the local transport conditions, needs, and planning.

Preliminary data from a quantitative survey on e-scooters use in Thessaloniki, Greece.

Although this survey is ongoing and the number of responses so far represent around the 1/3 of the target number, it was considered appropriate to present some indicative preliminary findings, which are the following:

1. The majority of users are men.

2. Almost 3/4 of users are less than 35 years old.

3. Over 90% of the respondents do not own an e-scooter, but the majority of the rest ones bought their own after having tried the dockless option.

4. Students account for almost 50% of users.

5. The majority of users spend 5-10 minutes for reaching and unlocking a scooter.

6. The 1/3 of users use an e-scooter at least one day per week.

7. Instead of using an e-scooter, users would have walked (63%) and used a public bus (31%).

8. Although the majority of users prefer to ride on the existing bicycle lanes, finally they use bicycle lanes (42%), the roadway (49%), and sidewalks (9%).

9. The majority of rides last less than 10 minutes.

10. The main motivations of use are fun, time-saving, and door-to-door travel, while as main disincentives were mentioned the cost, the unavailability of e-scooters nearby, the feeling of lack of safety, and bad weather conditions.

11. Most rides take place from Monday to Friday (over 60%).

12. Almost 20% combine the use of e-scooter with public bus or walking for their trip.

13. The mandatory use of helmets is likely to decrease e-scooter use.

In summation, these preliminary results show: a) the strong acceptance of young people of this type of micromobility; b) the massive use of bicycle lanes although, in practice, a large percentage also use the roadway; c) that price and safety are the main drawbacks of use; d) that there is a notable percentage of frequent users; e) that e-scooters can favour the intermodal option; and f) that e-scooter use acts competitively to walking and public transport, without clear impact yet on car traffic reduction. Hopefully, a detailed presentation of final results will be published in the near future.

4. Integrating e-scooters in Mediterranean cities

This new transport mode is still in its infancy and cities should assess, within their own context, whether e-scooters have a meaningful and sustainable role to play. Based on worldwide experience and current regulatory practices from several Mediterranean countries, we believe that Mediterranean cities can use a broad set of tools and methodologies to regulate smoothly e-scooters and micromobility.

Moreover, the following proposals can be derived:

1. E-scooters should be considered in cities' strategic planning and outlook: Qualitative and quantitative surveys on users and use, operational consultation with stakeholders, and suitable inclusion in mobility plans like the Sustainable Urban Mobility Plans (SUMPs) are main schemes for integrating them in cities' mobility.

2. Regulating access to the market and operations once in the market: This perspective may vary to some extent from city to city, based on the overall national legislative framework and depending on the degree cities have regulatory autonomy in this issue. A national regulation should provide the basic mandatory principles on this domain, while cities should be allowed to enact locally on key micromobility topics, such as traffic management, parking, use of public space, and license or select operators through binding or non-binding agreements.

3. Gradual access to shared e-scooter market: Depending on cities' legal power to control the access of operators to the market, they can consider several options, such as no specific regulations in place, general prohibition/ban, implementation of pilot actions for testing e.g. the impact of these services on the local transport system, and set up operational permits and performance requirements.

4. Regulating actual operations and vehicles' usage: E-scooter usage, both in shared or private form, can impact public space and affect users, thus it should be regulated. Specific terms and conditions, at a local level, may cover topics such as the number of the operators and the size of their fleet, vehicles' specifications, insurance coverage, geofencing for service limitations, speed limits, dockless and docked schemes, parking and riding areas, and fines for improper use.

5. Protection of local citizens: A city may require from operators, or find a way to reward, the stability of prices during a specific operational time, safety campaigns, and operation of a local contact/support point.

6. Data utilization: Cities can require from operators to provide them with anonymized data (e.g. trips that occurred and what type of users made them) from vehicles' usage for analysing, monitoring, and planning current, and future transport practices, actions, and policies.

7. Improvement of infrastructure and public transport: E-scooters, like bikes, are transporting vulnerable road users, while the provision of inadequate spaces for parking them does not support a sustainable alternative to space-consuming cars. Traffic calming zones, cycleways and bike lanes, where also e-scooters are allowed to circulate, and dedicated parking slots can support practically the desired modal shift. E-scooter speeding could be naturally addressed if used in woonerven zones (Nalmpantis, Lampou, & Naniopoulos, 2017) also improving walkability (Gkavra, Nalmpantis, Genitsaris, & Naniopoulos, 2019). Additionally, a reliable and properly managed public transport system is the basis for sustainable urban mobility, where e-scooters may become for many people a comfortable means for reaching the public transport network and leaving their car at home.

5. Conclusions

The overall goal of this article was to outline the current situation regarding the use of e-scooters, mainly regarding the free-floating scheme, and to identify relevant challenges for providers, stakeholders, citizens, and cities in the Euro-Mediterranean area.

When such services are introduced in cities without prior consultation, or pilot applications, with local authorities and society, the provision of micromobility modes of transport might delight some but confuse others. The somehow problematic experience, which has been publicized in local media, should not let cities to deter these services and modes from contributing to their mobility landscape. The legalization, standardization, and regulation of e-scooters' use, as recently began to happen in several Mediterranean countries and cities, in terms of classification, available road space, maximum speed, and safety rules is the first step towards allowing them to claim their modal share potential in cities' mobility strategies, plans, and everyday life.

With the increasing familiarity of shared e-scooters, a dynamic increase in private ownership of such vehicles has been observed in Greece, while media reports from shared e-scooter providers show a relevant potential for several other Mediterranean cities and countries. City authorities should give time to e-scooter market and regulate it thoughtfully at an early stage (e.g. on public safety requirements, parking and no-scooter zones, users' control and fines, etc.), based on the city's current experience, lessons from peer cities, and data from existing operators. Surveys, such as the aforementioned one for Thessaloniki, Greece, and public consultation can further help cities to find ways to manage current challenges, encourage more responsible e-scooter use, and integrate these and other micromobility modes smoothly into their urban mobility strategy.

In parallel, e-scooter providers should be proactive in addressing each city's transportation concerns and urban/social attributes. This can range from providing helmets and training to users to sharing specific data with officials, researchers, and academia. Micromobility service providers and the relevant local or national authorities can work together in order to identify mobility "pain points" and priorities where e-scooters may help to address them. In our analysis, we have not been able to gather data from private micromobility service providers in order to assess users' attributes and trip distances, temporal distribution, trip purpose, and modal shift. There is, therefore, a need for research at this level to quantify and analyse these parameters. The preliminary data from an ongoing survey presented here provide some indicative trends for Greece, but they should not be used as definitive before the completion of the survey and full data analysis, which will be the following step of our research.

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