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VMP's MICROMOBILITY ON URBAN ROADS

PMV MICROMOBILITY ON URBAN ROADS

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Resumen: La Micromovilidad urbana como realidad social y vial, se puede estimar que tiene en torno a un lustro de vida; aunque sin abandonar la esencia del término, que continúa siendo aplicable a toda modalidad o medio de transporte personal que se lleva a cabo a través de vehículos muy ligeros. En este tiempo, la tecnología ha avanzado a una velocidad de vértigo, ofreciendo múltiples ventajas, como sostenibilidad, comodidad, independencia, ahorro, etc., respecto a otras formas de desplazamiento tradicionales. Sin embargo, los indudables beneficios que ello supone no están exentos de importantes problemas y dificultades, siendo especialmente destacables los relativos a la convivencia vial diaria entre todos los usuarios de las vías públicas, manifestados de manera preocupante en la presencia de estos vehículos en la siniestralidad vial.

Dentro de esa evolución y ciñéndonos a la situación actual, hay que remarcar por encima de todos al vehículo de movilidad personal (VMP), y más concretamente al patinete eléctrico, puesto que es el que ha conseguido mayor aceptación de entre todos los aparatos impulsados por motor eléctrico, debiendo tanto el Legislador como las Administraciones y la sociedad en general, enfrentarse abiertamente al ineludible desafío de buscar y encontrar fórmulas legislativas que garanticen la convivencia pacífica y segura entre todos los usuarios de la vía.

Abstract: Urban Micromobility as a social and road reality can be estimated to be around five years old; although without abandoning the essence of the term, which continues to be applicable to any modality or means of personal transport that is carried out through very light vehicles, in this time technology has advanced at breakneck speed, offering multiple advantages, such as sustainability, comfort, independence, savings, etc., with respect to the traditional forms of displacement. However, the undoubted benefits that this implies are not exempt from important problems and difficulties, being especially noteworthy those related to daily road life among all users of public roads, manifested in a worrying way in the presence of these vehicles in the accident rate road.

Within this evolution and sticking to the current situation, it is necessary to emphasize above all the Light Electric Vehicles (LEV), and more specifically the electric scooter, since it is the one that has achieved the greatest acceptance of all the devices powered by electric motor, having both the Legislator and the Administrations and society in general,

openly face the unavoidable challenge of seeking and finding legislative formulas that guarantee peaceful and safe coexistence among all road users.

Palabras clave: Micromovilidad, seguridad vial, vehículo movilidad personal, patinete eléctrico, siniestro vial.

Key words: Micromobility, road safety, personal mobility vehicle, electric scooter, road accident.

1. INTRODUCTION

Throughout human history, the intelligence of humans has enabled them to facilitate the movement of people and cargo on land. The use of domesticated animals, sledges and other forms of traction evolved until the invention of the wheel in ancient Mesopotamia, and this has been in use for more than 7,000 years.

However, it was not until 1885, when Carl Benz invented the first three-wheeled automobile, that the use of the wheel developed significantly, although Ferdinand Verbiest's steam-powered wheeled vehicle had been around since the 17th century. (Puig J., 1999, pág. 1)

But the considerable physical dimensions of these new vehicles, together with their mechanical complexity, led to the emergence of a personal mobility vehicle in 1693. It was devised by Professor Ozana of the Sorbonne University in Paris, was transformed by the Frenchman De Sivrac and christened *Célérierifère* in 1790. In 1817, the German Baron Karl von Drais rescued it from oblivion, resulting in the emergence of his velocipede or “running machine” (*Laufmaschine* in German), a device which became the precursor of the bicycle after some modifications and was christened “steel horse” (*Eisen Pferd*, in German). (Malavé, S.J., 2018, págs. 4-6)

Since then, a huge succession of inventions has been trying to facilitate personal mobility. There was a notable milestone in 1885 when the German engineer, builder and industrialist Gottlieb Daimler used a bicycle with a single-cylinder engine of his own invention for the first time, thus creating the first motorbike. (AMV, 2018) This invention brought about a real-world revolution in personal mobility.

It is obvious that communication routes have evolved as the means of transport have evolved. We remember how the Romans built their first roads around 312 BC and the very important via Flaminia, a Roman road that led from Rome to Ariminum (today's Italian city of Rimini). It should also be remembered that it was the Romans who were the first to develop road signs on their roads with the millarios, which were stone columns measuring just over a metre and indicating the direction to a place and the distance to Rome, hence the saying: "All roads lead to Rome." (Recuento, P., 2015, pág. 1)

We have also observed that the various human inventions in terms of personal mobility from ancient times until now have been accompanied by the necessary adaptation of legislation that would allow these inventions to be used in a way that would not pose a danger to pedestrians or drivers themselves. So, we consider the event of the pharaoh Tutankhamun dying after allegedly being run over by a chariot to be what caused legislative repercussions on the circulation of vehicles in ancient Egypt. (Sala, A., 2022, pág. 1)

These legislative changes proliferated with the emergence of motor vehicles in the 19th century, as legislators were required to adapt the existing rules to regulate the use of these new devices by their users, the interaction between them and people who used animal traction – which was the predominant form of transport at that time – and these two forms of transport with pedestrians. These facts are confirmed by the curious English Locomotive Act, which stipulated that vehicles not pulled by horses (at that time vehicles without horses used boilers) should not exceed 3 km/h in cities and 6 km/h on rural roads

(Mircea A., 2004, pág. 11). There is further evidence with the creation of the first "modern" traffic signs, which were implemented by the Italian Automobile Club and accepted and extended at European level back in 1909. (Mellado, L., 2022, pág. 8)

In Spain, when Antonio Cánovas del Castillo was President of the Council of Ministers, the Royal Order of 1897 was approved, which was the first regulation on the circulation of motor vehicles in Spain. It then took more than 20 years from 1926 to 1949 to unify all the traffic signs throughout Europe, with the United States joining in 1960.

1.1 OBJECTIVES

After this brief introduction about the impact of incorporating a new means of transport, we now move on to an analysis of micromobility in personal mobility vehicles (PMVs) (Parlamento Español, 2020, pág. 98642). The search for economy, greater respect for the environment, improved mobility, manoeuvrability, agility, accessibility, etc., have resulted in the emergence of inventions such as electric scooters (La Vanguardia, B., 2022, pág. 1), electric unicycles (Landaverde, LF et al., 2013, pág. 33), segways (Boniface K, McKay MP, Lucas R, Shaffer A, Sikka N, 2010, págs. 370-374), (Sawatzky B. et al., 2007, págs. 1423-1428), (Boutilier G., et al., 2012, págs. 595-598) and hoverboards (Gómez-Cabrero S., 2016, pág. 24). However, we will focus our attention on the so-called electric scooters as they are currently the predominant ones, and more specifically, those conceptualised in Section 1 "Definition of Personal Mobility Vehicle (PMV)" of the Directorate General of Traffic (DGT) Resolution of 12 January 2022, which approves the manual of characteristics of PMVs (Parlamento Español, 2022, pág. 6884):

A single-seated vehicle with one or more wheels, powered exclusively by electric motors that can give the vehicle a maximum design speed of between 6 and 25 km/h. They can only be equipped with a seat or saddle if they are equipped with a self-balancing system.

Similarly, Section 2 of this Resolution sets out the technical characteristics that PMVs for personal transport must have, as shown in the following tables.

VMP de transporte personal	
Velocidad máxima	Entre 6 y 25 km/h
Potencia nominal ⁽³⁾ por vehículo.	Vehículos sin auto-equilibrado: ≤ 1.000 W Vehículos con auto-equilibrado ⁽⁴⁾ : ≤ 2.500 W
Masa en orden de marcha ⁽⁵⁾ .	< 50 kg
Longitud máxima.	2.000 mm

⁽³⁾ La potencia nominal deberá ser declarada por el fabricante del motor y medida según el apartado 4.2.14 de la norma EN 15194:2018, o alternativamente en el Reglamento n.º 85 de la Comisión Económica para Europa de las Naciones Unidas (UNECE) - Disposiciones uniformes relativas a la homologación de motores de combustión interna o de grupos motopropulsores eléctricos para la propulsión de vehículos de motor de las categorías M y N en lo que respecta a la medición de la potencia neta y la potencia máxima durante 30 minutos de los grupos motopropulsores eléctricos (DO L 323 de 7.11.2014, pág. 52).

⁽⁴⁾ Al menos el 60% de esta potencia se debe dedicar al sistema de autoequilibrado.

⁽⁵⁾ Masa en orden de marcha: masa del vehículo tal y como se define en el artículo 5 del Reglamento (UE) n.º 168/2013.

Tabla 1. Características de VMP de transporte personal

Altura máxima.	1.400 mm
Anchura máxima.	750 mm

Table 1. Characteristics of PMVs for personal transport.

Source: https://www.boe.es/diario_boe/txt.php?id=BOE-A-2022-98.

The electric scooter is a PMV with undoubted advantages in terms of economy, environmental friendliness and manoeuvring agility. In addition to this, the fact that you do not need a license or insurance to use it in our cities makes it enormously attractive. However, the lack of training, if not the recklessness of many of its users, together with the absence of homogeneous regulations at state level, have turned its use into a considerable road safety and coexistence problem that must be solved as soon as possible. In 2018, according to data from the Road Safety Prosecutor's Office, there were 273 accidents involving personal mobility vehicles in which five fatalities were recorded (López J., 2019, pág. 2), and these figures are unfortunately on the rise.

In addition to this and bearing in mind that we are currently still in a state of flux regarding the need for insurance, it is undeniable that the drivers of this type of vehicle are liable for the damage they may cause, and therefore the non-contractual civil liability derived from Art. 1902 or, if applicable, 1903 of the Spanish Civil Code. Furthermore, in order for it to be applied, it must be proven that the road accident causing the damage was due to the fault or negligence of the driver. This is the same for the homicides and/or injuries that they may cause through recklessness, as set out in Art. 142 and 152 of the Spanish Criminal Code respectively.

In relation to this liability, a recent court ruling is cited below:

- Judgment of the Provincial Court of Asturias, no. 155/2023, of 5 April, in which *"by means of this judgment, the liability of a PMV driver who ran over a pedestrian causing the pedestrian a series of injuries while the pedestrian was walking on the pavement was upheld. Considering the existence of non-contractual liability under Art. 1902 of the Civil Code, it is proven that the driver of PMV was negligent in not respecting the pedestrian's right to use the pavement."*

In observing the facts referred to here, the legislator has been generating instructions and laws that try to regulate the use of these PMVs since 2016. These include Instruction 16/V-124 of the Directorate General of Traffic (DGT), of 3 November 2016 (Ministerio del Interior, DGT, 2016, pág. 2); Instruction 19/S-149 TV-108 of the DGT, of 3 December 2019 (Ministerio del Interior, DGT, 2019, págs. 3-4); Royal Decree 970/2020, of 10 November (Parlamento Español, 2020, págs. 98640-98641-98642); Law 18/2021, of 20 December (Parlamento Español, 2021, págs. 156150-156152-156153), and the Resolution of 12 January 2022, of the DGT, approving the PMV Characteristics Manual. (Parlamento Español, 2022, pág. 6884)

However, the aforementioned laws show a lack of rigour in the area of road safety by delegating to local councils, through their local ordinances, the regulatory development of an issue that is so key for the road safety of citizens and which has a powerful impact on the accident rate. This turns the national panorama into real legislative gibberish regarding PMVs. In this regard, we believe that a single minimum legal age for drivers should be established throughout Spain, protective helmets should be compulsory, and there must be an obligation to take out civil liability insurance for these devices. These matters were already covered by the Director of the DGT, Pere Navarro, and published in La Vanguardia in 2021: *"The government plans to regulate other aspects, such as the minimum age for driving a PMV, the obligation to wear a helmet and reflective elements and the need to have traffic insurance"*. (Moreno, S., 2021, pág. 3).

1.2 METHODOLOGY

Given the aforementioned circumstances, we will focus our attention on the current and incipient problem posed by these vehicles in towns, and more specifically in the city of Malaga. We will make certain comparisons with the whole of Spain and with the city of Lisbon due to its demographic similarity with Malaga. For this purpose, we proceeded to analyse several parameters, such as the aforementioned national and local regulatory framework, the Malaga Local Police's surveillance and checks on compliance with traffic legislation by drivers of these vehicles, the road infrastructure of the city, and the road accident rate with PMVs occurring between the calendar years 2019 and 2022. We did this by obtaining documentary legal data, own sources requested from the City Council of Malaga and its Local Police Force, the DGT and the Lisbon Public Security Police (PSP), as well as exploratory interviews with experts in the field of road safety from various organisational areas.

2. NATIONAL AND LOCAL REGULATORY FRAMEWORK

2.1 NATIONAL PMV LEGISLATION

Urban mobility, together with technological progress, is evolving at an accelerated pace and this has resulted in the enormous impact of PMVs in Spain in recent years. They surprised the public authorities when they burst into society without there being any specific legal regulation for these types of vehicles.

Consequently, different road users began to coexist in the same road space, giving rise to problems of daily coexistence due to the lack of a legal framework regulating issues such as where they should travel, whether they could carry passengers, whether they needed administrative authorisation to drive, whether helmets should be worn, whether they should have lights, civil liability insurance, etc.

As a result of this chaotic situation, there was an increase in accidents and less road safety for all road users, as shown in Table 2, which, based on official DGT data, shows the accident figures for PMVs in 2019 and 2020, the two years prior to their regulation.

Years	Accidents with victims	Deaths	Hospitalisations	Non-hospitalised injuries
2019	908	5	137	798
2020	1305	8	97	1097

Table 2. Data on road accidents involving PMVs nationally in 2019 and 2020.

Source: created by the authors based on data from the DGT's Key Road Accident Figures

And this all occurred at a time when road accidents have become one of the key concerns of the 21st century for different countries. This is because their serious consequences and the need to adopt various public policies that contribute to reducing the number of serious injuries and deaths caused by road accidents have become apparent. The authorities are aware enough of this that it has led, within the framework of European policies, to the United Nations General Assembly resolution 74/299 declaring a Decade of Action for Road Safety 2021-2030 "with the aim of reducing road traffic deaths and injuries by 50% during that period." (OMS, 2021, pág. 6)

Finally, and in light of all of the above, the legislator drew up and developed the national regulatory framework regulating PMVs, which is set out in the chronological order of its entry into force in the Introduction, section 1.1 Objectives, of this article.

A summary of the above-mentioned regulatory changes regarding the circulation of electric scooters is shown visually in the following image:



Image 1. Descriptive summary of the rules of the road for electric scooters prepared by the DGT. Source: <https://www.dgt.es/muevete-con-seguridad/viaja-seguro/en-patinete/>

Directly related to the image above, and taking into account that all users of these vehicles must comply with minimum traffic conditions, the penalties that they entail under current traffic legislation are as follows:

- Prohibiting PMVs from driving on pavements, pedestrian areas, motorways, dual carriageways, interurban roads or tunnels in urban areas. The roads authorised for driving will be indicated in a municipal ordinance. If there is no such road, driving is allowed on any urban road. Penalty of 200 euros (serious infringement).
- The speed of these vehicles shall be between 6 and 25 km/h. If they exceed this speed, they are not considered a PMV, so they will not have administrative authorisation to circulate, with a fine of 500 euros (very serious offence) and immobilisation of the vehicle.
- The prohibition of using a mobile phone, headsets or headphones connected to sound receivers or players while riding a scooter, punishable by a fine of 200 euros (serious offence).
- These are single-seater vehicles, prohibiting the circulation of two or more people in the same vehicle, which is a minor offence with a fine of up to 100 euros.
- Driving without lighting, reflective clothing or reflective elements is considered negligent driving, since the user does not take the necessary diligence to be seen by other drivers on the road and puts themselves in danger. Penalty of 200 euros (serious infringement).

- Driving under the influence of alcohol and/or drugs is prohibited. In these cases, a positive result for alcohol under 0.50 mg/l would carry a fine of 500 euros. If the breath test is higher than 0.50 mg/l, the fine would be 1000 euros, while a positive result for drugs would carry a fine of 1000 euros, and the vehicle would be immobilised in all cases.

By way of comparison with European legislation in this respect, it is worth looking at the "European Bicycle and PMV Review Survey" carried out by the DGT Road Safety Observatory in 2021, in which questionnaires were sent to the 27 countries of the European Union. 17 of these countries responded, and the general conclusions of the survey were: "*For all these reasons, voluntary training and a minimum age for riding a bicycle or electric scooter are the most widespread initiatives in the EU.*" (DGT, Observatorio de Seguridad Vial, 2022, pág. 60)

2.2 MALAGA MUNICIPAL REGULATIONS

Once the national legislative framework regulating PMVs came into force, Malaga City Council published the Mobility Ordinance of the City of Malaga in the BOJA on Tuesday 19 January 2021, which came into force the following day. This ordinance aims to develop this legislation and adapt to the new times of urban mobility. This regulation devotes Heading IV entirely to "*Personal Mobility Vehicles*", specifically Articles 36 to 45. (Ayuntamiento de Málaga, 2022, págs. 78-83)

In summary, after analysing and detailing the national legislation that currently regulates the circulation of electric scooters, it can be indicated that each city council can regulate the circulation of these vehicles in a specific way by means of regulations regarding the obligation to ride with a protective helmet, the minimum age to drive them and the prohibitions related to stopping and parking these vehicles.

A very important issue to take into consideration with the circulation of these vehicles on urban roads is that the pavement is indisputably for pedestrians and the road is for all motor vehicles, so the PMVs are stuck in the middle. As they are not considered one or the other, there is a clear imbalance, disadvantage and defencelessness. That is, in the event of a road accident due to an electric scooter circulating on the pavement, the greatest risk of collision and possible injuries will always be for the pedestrian, while in the case of a road accident involving an electric scooter travelling on the road, the most damaging result will be for the driver of the scooter, which causes a real problem.

This was all stated by the Director General of Traffic, Pere Navarro Olivella, at the opening of the Ciudades a Pie Forum in Madrid on 5 March 2019:

The pavement is for pedestrians. Pedestrians are the weakest link in the mobility chain and the proof of this is that more than 300 people are killed by being hit by cars every year in Spain, and these figures soar among older people, who account for more than 70% of those hit by cars. (DGT, 2019, pág. 6)

3. MALAGA LOCAL POLICE'S SURVEILLANCE AND CONTROL OF COMPLIANCE WITH TRAFFIC LEGISLATION BY THE DRIVERS OF THESE VEHICLES

Malaga is the sixth most populated city in Spain, with 579,076 inhabitants according to data published on 1 January 2022. (Instituto Nacional de Estadística, 2022, pág. 1)

One reason for this is the weather: "*Malaga is the Spanish province with the most motorbikes per inhabitant, registering 10,958 two-wheeled vehicles per 100,000 citizens, ahead of Gerona and Granada*"(Asociación Nacional de Empresas del Sector de Dos Ruedas, ANESDOR, 2020, págs. 21-22). This shows the city's drivers' predilection for this type of mobility.

There is currently no municipal census of private electric scooters in Malaga, contrary to what is recommended in the aforementioned legislation. Therefore, it is not possible to quantify the exact number of these vehicles that circulate daily on the various roads in Malaga, with experts in the field consulted estimating that the fleet of these vehicles in Malaga is currently around 3,700 electric scooters, of which only 1,344 are registered, and this is because they are owned by companies operating services.

As of today, the Malaga Local Police Force has a total of 895 officers according to data provided by the Chief Intendant 2nd Chief of the Malaga Local Police, José María Martínez Vázquez.

Bearing in mind that "*according to security theoreticians the optimum ratio in this situation should be around two police officers per 1,000 inhabitants, provided that the functions carried out are those legally determined,*" (Cámara de Cuentas de Andalucía, 2000, pág. 2) the appropriate number of police officers in the Malaga Local Police should be 1,158, so it is clear that there is a deficit of 263 police officers, which is 23% below the recommended number.

Once the variables that may influence this chapter are known, a summary of offences committed by PMV drivers and reported by the Malaga Local Police in 2021 and 2022, which was requested from the Penalties Department of the Malaga City Council's Autonomous Tax Management Body, is shown below.

Descripción	Suma	2021	2022
Acceder sin autorización con un VMP a una vía cuyo paso está restringido a determinados usuarios.	1	1	0
Rebasar un semáforo en fase roja con un VMP.	347	148	199
Estacionar un VMP sobre la acera o zona peatonal, de modo que se obstaculice gravemente el tránsito de los peatones.	16	16	0
Explotar comercialmente un VMP en alquiler, o para rutas turísticas, careciendo de seguro de responsabilidad civil	1	0	1
Circular con un VMP realizando maniobras bruscas.	3	1	2
Circular con un VMP de forma negligente.	39	21	18
Circular con un VMP agarrándose a vehículos en marcha o siendo remolcados por éstos.	2	1	1
Circular con un VMP utilizando auriculares receptores o reproductores de sonido.	134	57	77
Circular con un VMP utilizando dispositivo de telefonía móvil o cualquier otro dispositivo de análoga naturaleza.	148	69	79
Circular con un VMP cruzando pasos para peatones.	37	14	23
Circular con un VMP por zona afectadas por cualquier evento deportivo, cultural o religioso.	1	0	1
Circular con un VMP por las aceras, paseo, y demás zonas destinadas al uso de peatones.	553	245	308
Circular con un VMP por las zonas 20, calles residenciales y vías de plataforma única sin respetar en todo momento la preferencia peatonal.	7	5	2
Circular con un VMP por zonas restringidas al tráfico sin respetar la prioridad peatonal.	8	5	3
Circular con un VMP por vías ciclistas sin respetar la prioridad de paso de los peatones o vehículos en los cruces señalizados y/o regulados por semáforo.	3	1	2
Estacionar un VMP fuera de las reservas señalizadas para tal fin.	355	179	176
Estacionar un VMP sobre la acera o zona peatonal.	17	17	0
Estacionar un VMP en lugar distinto de los estacionamientos señalizados para poder hacerlo.	0	0	0
Circular por la acera con un VMP perturbando la normal circulación de los peatones.	2	2	0
Conducir un VMP portando a dos o más personas.	17	15	2
Conducir un VMP siendo menor de 16 años.	196	88	108
Circular con animales u objetos que dificulten la conducción segura de un VMP.	2	2	0
Circular con un VMP que carezca de sistema de frenada, timbre, luces delanteras y traseras, o elementos reflectantes y/o catadiópticos.	8	3	5
Circular con un VMP sin llevar las luces encendidas a cualquier hora del día.	41	22	19
Circular con un VMP sin llevar casco protector por la calzada de las vías que no sean ZONAS 30, ZONAS 20, o carriles limitados a 30 km/h.	267	144	123
Circular con un VMP sin usar chaleco reflectante o elementos visibles a 150 m. Circulando por la calzada de las vías que no sean ZONAS30, ZONAS 20.	83	56	27
Circular con un VMP sin respetar una distancia mínima de separación de un metro con los peatones.	10	4	6
Circular con un VMP cuando se produzcan una aglomeración de personas.	13	3	10
Circular con un VMP en ZONAS30 y max.30 sin banderín de seguridad cuando el conjunto VMP-conductor no alcance 1,40cm de altura	1	1	0
Adelantar sin la precaución requerida con un VMP cuando circule por un carril bici.	4	2	2
Circular con un VMP por un túnel urbano	1	0	1
Circular con un VMP con una tasa de alcohol superior a la permitida.	5	3	2
Circular con un VMP habiendo consumido estupefacientes, psicotrópicos, estimulantes u otras sustancias análogas.	1	0	1
Circular con un VMP de forma temeraria.	19	11	8
Conducir un VMP de modo temerario.	1	1	0
Circular con un VMP en sentido contrario al estipulado	152	71	81
	TOTAL	2.495	1208
		1287	

Table 3. Statistics on PMV offences in Malaga in 2021 and 2022.

Source: statistics requested from the Autonomous Tax Management Body of Malaga City Council (GESTRISAM).

As can be seen in Table 3, the total number of reported infringements is similar in the two years under study, at 1208 in 2021 and 1287 in 2022. Calculating an average number of offences reported daily by the Malaga Local Police, the result would be 3.31 daily reports issued during 2021 and 3.53 during 2022.

A fact to be taken into account is the type of offence most reported in the two years mentioned above, which is "circulating with a PMV on pavements, walkways and other areas intended for pedestrian use." This is defined in the aforementioned Mobility Ordinance in Article 40.A1 and incurs a fine of 200 euros (Ayuntamiento de Málaga, 2022, pág. 80). There were a total of 245 complaints in 2021 and 308 complaints in 2022, around 20% and 24% of the total respectively. This statistic is directly related to the phrase most often repeated by drivers of these vehicles: "I prefer to risk being reported by the local police for riding on the pavements than risk my life by riding on the road with other vehicles." This phrase reflects the difficult balance of coexistence between road users. The author foresaw a problem with this in the short or medium term due to the reluctance of electric scooter riders to ride on the road because of how unsafe it felt.

In addition to the initial information campaign launched when the above-mentioned national and local legislation came into force, the Directorate General of Traffic carried out one of these campaigns in the period from 25/10/2021 to 07/11/2021 as part of its planning of road safety prevention campaigns. The slogan of this campaign in several Spanish cities was "No pasa": *"The DGT starts a campaign in Malaga to monitor bicycles and scooters on the pavements."* (Ignacio, L., 2021, pág. 1)

With regard to general obedience and/or compliance with traffic regulations by electric scooter riders, there was a consultation of the survey presented by the Línea Directa Foundation in collaboration with the Spanish Foundation for Road Safety (FESVIAL), dated 27 April 2022, which surveyed 1,700 people nationwide. Only 14% of those surveyed believe that they habitually comply with traffic regulations, which means that electric scooter users are the drivers with the worst image in traffic. The survey showed that *"50% of PMV users recognise that they ride without a helmet, 73% sometimes ride on the pavement and 45% have at some point exceeded speed limits established for these vehicles (25 Km/h)."* (Fundación Línea Directa, 2022, pág. 2)

4. ROAD INFRASTRUCTURE FOR PMVs

4.1 IN THE CITY OF MALAGA

Malaga has a surface area of 394.98 km² and a perimeter of 145,428.59 m, according to data from the Andalusian Institute of Statistics and Cartography. (Junta de Andalucía, 2022, pág. 1) It has approximately 1,200 km of road or carriageway for vehicle traffic and is divided into 11 districts (territorial management divisions), with their respective neighbourhoods and industrial estates.

The information on bicycles, and therefore PMVs, on the municipal website (Ayuntamiento de Málaga, 2020, págs. 3-4-5) states: *"Malaga currently has 44,025 metres of cycle paths."*

Several municipal sources and experts were consulted on the subject, including the current Councillor for Mobility of Malaga City Council, Trinidad Hernández Méndez, who points out that personal mobility vehicles are, as their name indicates, vehicles, so they must circulate on the road. However, to do so with optimal road safety conditions, they need to have segregated road infrastructure that guarantees the greatest possible protection for all traffic users.

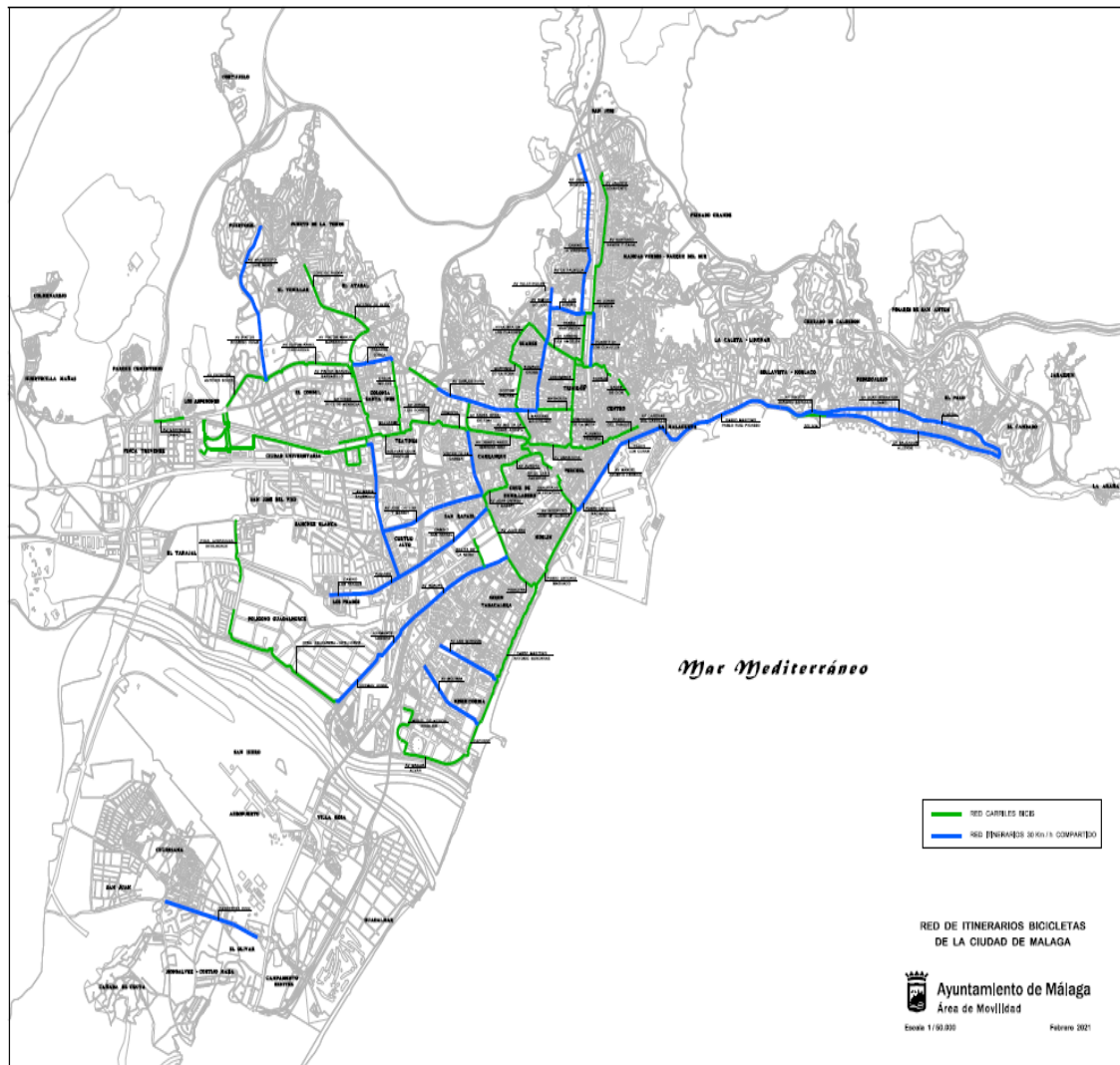
The Mobility Department of Malaga City Council has been working along these lines for some time now, and the planning of road needs in terms of infrastructure for cyclists and PMVs is set out in the "Malaga Bicycle Master Plan". This municipal plan expects to have 142 km of bike/PMV lanes by the end of its implementation, at an estimated cost of around 43 million euros. (Sanchez, S., 2022, pág. 1)

Malaga currently has the following road infrastructure for PMV traffic:

1. 45 km of segregated infrastructure for the exclusive use of bicycles and PMVs, with eight projects in the process of implementation and completion. This will increase this type of road to 60 km, as indicated on the municipal website.

2. 70 km of roads on which there is priority for PMVs and bicycles. These are two-lane roads in each direction, and it is the right lane that has this regulation, with a limit of 30 km/h when riding on this type of road, also known as bike lanes.

Image 2 below shows a map of Malaga at a scale of 1/50,000, published in February 2021 on the website of the Mobility Department of Malaga City Council. It shows the network of cycle routes in February 2021, in which the green line identifies the network of exclusive bike/PMV lanes, and the blue line indicates the network of shared 30 km/h routes, as explained in the previous paragraph.



GAP15013020221

Image 2. Map of the network of bike/PMV lanes in Malaga, February 2021.

Source: <https://movilidad.malaga.eu/opencms/export/sites/movilidad/.content/galerias/Documentos-del-site/Red-de-itinerarios-de-bicicletas.pdf>

By looking at image 2 while also taking into consideration the opinion of users and experts in the field and all the variables and/or circumstances relating to demography, territorial extension and division, vehicle fleet, urban importance, sustainability, social and road demand detailed and analysed, it is clear that the current 45 km of segregated infrastructure for the exclusive use of bicycles and PMVs (soon to be 60 km) is insufficient to properly meet the needs of drivers of these vehicles and other road users.

Consequently, it is also insufficient to guarantee urban road safety with the main objective of reducing the accident rate. PMV users consulted for this purpose also agreed.

Similarly, on the basis of the above, it can be determined that the network of shared 30 km/h routes in Malaga is also insufficient and disjointed, with approximately 6% of the total kilometres of carriageway used for vehicle traffic. Therefore, if they are not allowed on pavements and other pedestrian areas, and there are not enough dedicated segregated bike lanes, more and better quality 30 km/h cycle lanes for bicycle and PMV users are essential.

This option of bike lanes or shared lanes has many detractors for different reasons. These detractors cite as an example what was published on the website of the El Confidencial newspaper on 19 November 2021 (Pascual, A., 2021, pág. 12):

In 2016, a detailed study published by the University of Colorado compared bike lanes with cycle paths, which are protected and run separately from traffic, and concluded that cycle paths were twice as effective in encouraging cycling because they were perceived as safer. In addition, the researchers noted that, compared to normal streets, accidents involving cyclists decreased by 42% in areas with cycle paths, compared to 20% in bike lanes.

In relation to the above, mention is made of a news item published in the *Diario Sur de Málaga*, which stated that *"Malaga has 0.78 km of cycling lanes per ten thousand inhabitants, three times less than Seville or Palma de Mallorca."* (Jiménez, F., 2022, pág. 1)

4.2 COMPARATIVE STUDY WITH OTHER SPANISH CITIES

In order to understand the state of road infrastructure and the use of public space by other local administrations working on urban traffic management for PMVs, the following is a study carried out by the Organisation of Consumers and Users (OCU), which has analysed the functionality of cycling infrastructure in 14 cities: the eight most populated and six others that are included because of the boost they are giving to bicycles and personal mobility vehicles.

This organisation believes that *"a useful cycling network should meet seven criteria: it should be complete, continuous, uniform, direct, recognisable, dense and on main roads. If it is a useful network, it will also be safer,"*(OCU, 2022, pág. 5). The result of the study is shown in Table 4:

Valoración de las redes ciclistas

Vías ciclistas	FUNCIONALIDAD DE LAS REDES							CALIFICACIÓN GLOBAL	RESPECTO A 2013
	Completa	Continua	Uniforme	Directa	Reconocible	Por vías principales	Tupida		
VITORIA	★★★★★	★★★★★	★★★★	★★★★	★★★★★	★★★★★	★★★★★	★★★★★	▲
SEVILLA	★★★★★	★★★★★	★★★★★	★★★★	★★★★	★★★★★	★★★★	★★★★★	▼
VALENCIA	★★★★★	★★★★★	★★★★	★★★★	★★★★★	★★★★	★★★★	★★★★★	▲
BARCELONA	★★★★	★★★★	★★★	★★★★★	★★★★★	★★★★★	★★★★	★★★★★	▲
SAN SEBASTIÁN	★★★	★★★	★★★	★★★★	★★★	★★★★	★★★	★★★★	▼
ZARAGOZA	★★★	★★★	★★	★★★★	★★★	★★★★	★★★	★★★	▲
CÁDIZ	★★★	★★★	★★★	★★★	★★★★	★★★	★★★	★★★	▲
LAS PALMAS	★★★	★★★	★★★★	★★★	★★★	★★★	★★	★★★	▲
VALLADOLID	★★	★★	★★	★★★	★★★	★★★	★★	★★★	▲
BILBAO	★★	★★	★★	★★	★★★	★★	★★	★★	▲
MÁLAGA	★★	★★	★★	★	★★★	★★★	★	★★	▲
CÓRDOBA	★★	★★	★	★★	★★	★★	★	★	=
LA CORUÑA	★	★	★	★	★★	★	★	★	▲
MADRID	★	★	★	★★	★	★	★	★	=

Table 4. OCU's assessment of cycling infrastructure in 14 cities.

Source: <https://www.ocu.org/coches/bicicletas-electricas/noticias/mejores-ciudades-para-bicis>

As can be seen in the table, although Malaga has improved compared to the last study carried out in 2013, it is still poorly rated with regard to the functionality of its cycle networks, with the OCU study concluding that it "also regrets the use of the bike lane, which is nothing more than a bicycle painted on the road with a 30 km/h sign, leaving cyclists at the mercy of cars." (OCU, 2022, pág. 9)

Another of the conclusions reached, as published in the Diario Sur newspaper article entitled "Malaga's cycle lanes, at the back of the national pack", is that "the OCU study describes the cycling network in the city of Malaga as 'bad' because it is insufficient and unconnected and criticises the abuse of the 30km/h lanes 'which leave cyclists at the mercy of cars'." (Jiménez, F., 2022, pág. 1)

Similarly, the image below specifically shows an erroneously designed cycle network in the Trinidad and Perchel area of Malaga, on which it is stated *"the road makes a detour and does not use the main road, which it crosses in a straight line."*



La vía da un rodeo y no usa la calle principal que atraviesa en línea recta.

Image 3. Example of Malaga's poorly designed cycling network.

Source: <https://www.ocu.org/coches/bicicletas-eléctricas/noticias/mejores-ciudades-para-bicis>

5. ROAD ACCIDENTS INVOLVING PMVs

5.1 ANALYSIS OF PMV ROAD ACCIDENT RATES IN MALAGA

This section is the main pillar of this study given the author's concern about the growing number of road accidents arising from the use of electric scooters in general, and particularly in Malaga city.

In the world of road safety, of which we are all a part in one way or another, the primary and most important objective is to reduce the number of road accidents and thus the many personal and social consequences that these entail. That is why the report of the World Health Organisation (WHO) was drafted and then published on 20 June 2022. (OMS, 2022, pág. 1)

In addition, the WHO and the UN Regional Commissions, in cooperation with UN Road Safety Collaboration partners and other stakeholders, have developed the "Global Plan for the Decade of Action for Road Safety 2021-2030", (OMS, 2021, pág. 30) which concludes with the following message:

This global road safety action plan calls on governments and stakeholders to take a new path that emphasises safety as a core value within the safety and sustainable mobility system. We know what we have to do, we have the tools to do it and we all have a role to play. So, let's do it.

In light of the final sentence of the previous paragraph, and with the aim of understanding the evolution of road accidents involving PMVs in Malaga during the period of four calendar years between 2019 and 2022, a series of graphs below show the existing statistical information in the database of the Accident Investigation and Attestation Group (GIAA) of the Malaga Local Police.

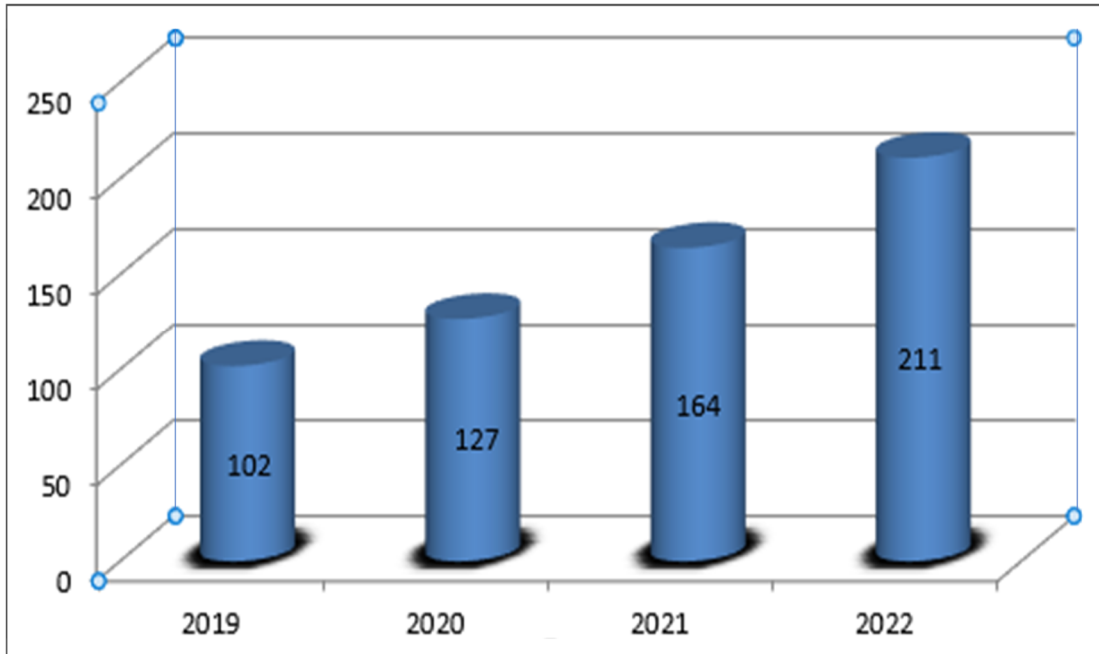


Figure 1. Statistics and results of road accidents involving PMVs in Malaga during the years 2019, 2020, 2021 and 2022. Source: created by the authors based on statistical data from the Malaga Local Police Force, as recorded in the GIAA.

This graph clearly shows the growing trend in the number of road accidents involving PMVs in Malaga over the last four years, with an increase in the number of accidents from 102 in 2019 to 211 in 2022, an increase of 106%. Despite the 604 accidents of this type during this four-year period, it is worth noting that, fortunately, no road accident involving a PMV has resulted in a fatality in Malaga.

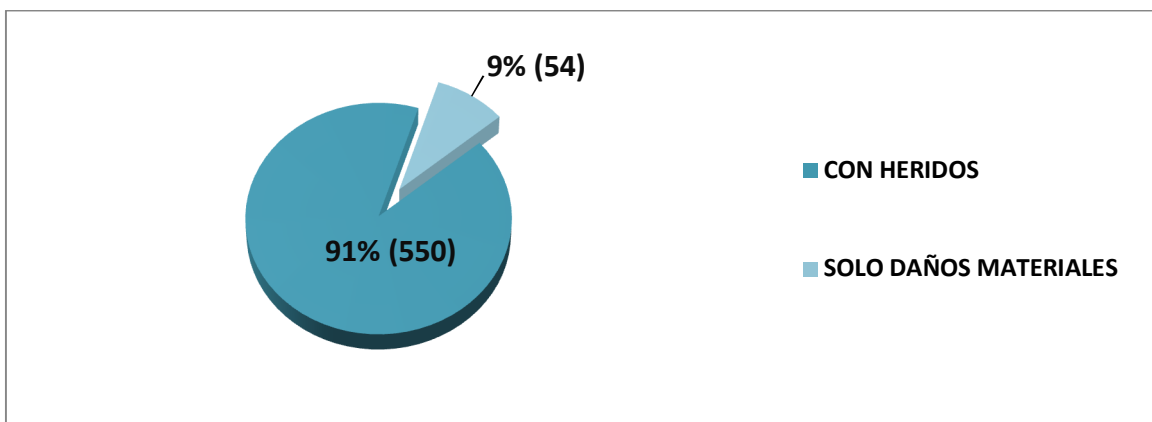


Figure 2. Total percentage of PMV road accident outcome type in Malaga from 2019 to 2022. Source: created by the authors based on statistical data from the Malaga Local Police Force, as recorded in the GIAA.

In terms of the consequences of these road accidents, Figure 2 shows that the average for this time period reflects the total is divided between 9% material damage (54 road accidents) and 91% personal injury (550 road accidents).

Similarly, an analysis of the statistics on the total number of such road accidents according to the type of accident during the period covered by the study shows that there are three main types of road accidents: head-on collision (252), two-wheeled vehicles falling (112), and people being run over (98), which account for 76.5% of the total.

With regard to the causality of these road accidents, once the statistical data in the GIAA has been verified, it can be stated that the main cause of these accidents was "distracted or inattentive driving", with a total of 72 cases, closely followed by "lack of skill" and "failure to respect traffic light signals", with 71 road accidents resulting from these two. The sum of these three causal events corresponds to 35% of the total.

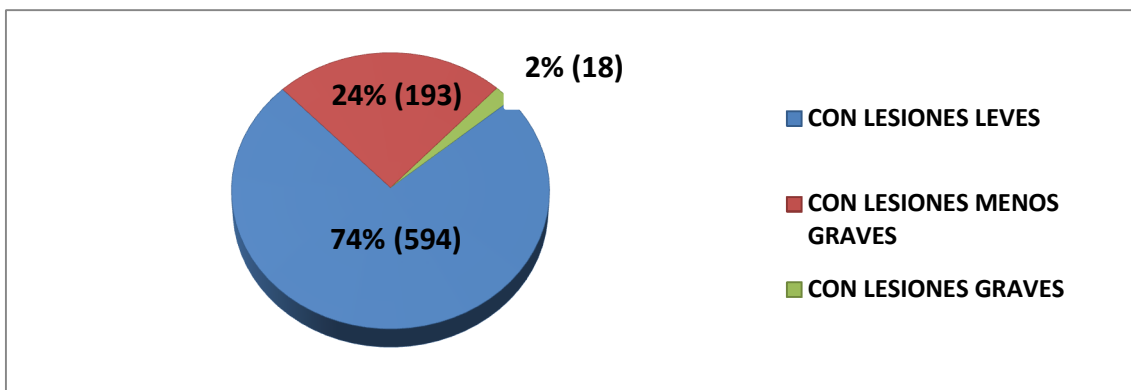


Figure 3. Percentage of people injured in the accidents covered by this study, classified according to the severity of the injuries. Source: created by the authors with statistical data extracted from the Accident Reports in the GIAA of the Malaga Local Police.

In terms of the severity of the injuries suffered by the people involved in road accidents involving electric scooters, Figure 3 shows that out of a total of 805 people injured, minor injuries account for almost two thirds of all injuries, followed by less serious injuries, with serious injuries accounting for a minimal percentage. These results show that the vast majority of the road accidents described are minor-injury crashes, i.e. without hospitalisation or with a hospital stay of less than 24 hours and without medical or surgical treatment. (Parlamento Español, 2014, págs. 97966-97967)

Also, as shown in Table 5 below, the number of people injured has increased significantly between 2019 and 2022, from 91 to 379, an increase of 316%, while the severity of injuries has also increased.

YEARS	SEVERITY OF INJURIES				
	MINOR	LESS SERIOUS	SERIOUS	DEATH	OVER ALL
2019	81	7	3	0	91
2020	100	20	4	0	124
2021	133	76	2	0	211
2022	280	90	9	0	379
OVERALL	594	193	18	0	805

Table 5. People seriously injured as a result of being involved in a road accident with a PMV in Malaga from 2019 to 2022. Source: created by the authors with statistical data belonging to GIAA.

To conclude this analysis, Figure 4 shows the classification of the injured people by age group. The above Figure clearly shows that 79% of the accident victims included in this study belong to the adult age group, i.e. between 18 and 64 years of age, followed at a considerable distance by minors (9%) between 14 and 17 years of age, with children and the elderly being the fewest, with 6% each.

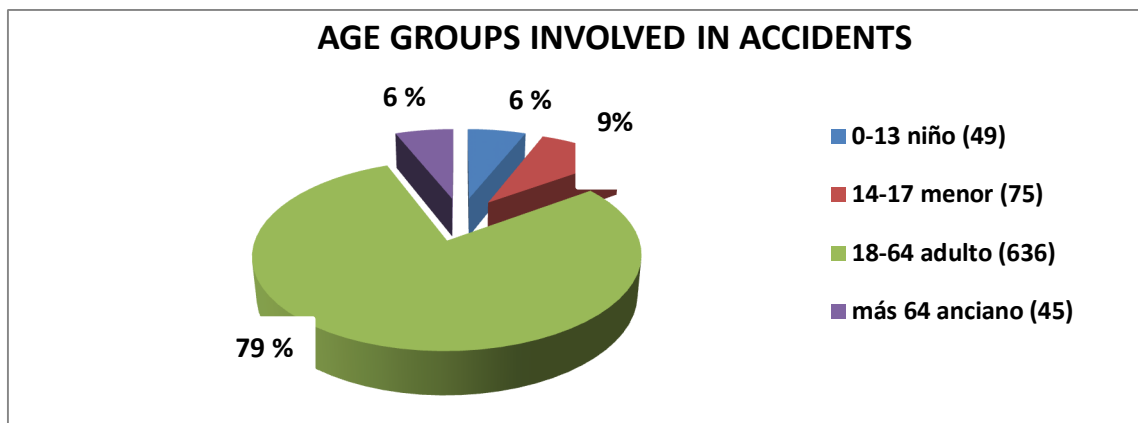


Figure 4. Percentage of age groups of people involved in road accidents with PMVs in Malaga in the last four years. Source: created by the authors with statistical data belonging to GIAA.

As a partial synthesis of the observation and analysis of the data, tables and figures shown in this study, it can be seen that:

- There was a notable increase in the number of road accidents under analysis, specifically a 106% increase, in the period under study.
- There were no fatal road accidents involving a PMV.
- 91% of these accidents resulted in injuries to people.
- The most frequent type of accident was a head-on collision, with the main cause being "inattentive or distracted riding."

- 74% of the injuries were minor.
- The most affected age group was adults (18–64 years old), with 79% of the total.

5.2 COMPARATIVE ANALYSIS WITH NATIONAL STATISTICS AND REFERENCE TO THE ROAD SAFETY STRATEGY 2021-2030

In order to prepare this section, and due to the lack of specific open sources in this respect, statistical data has been requested from the Observatory of the Directorate General of Traffic, specifically the rates of road accidents involving PMVs across the whole of Spain in the period between 2019 and 2022. The data provided by this public body is verified and analysed in the following Table 6, which summarises the most interesting results:

YEARS PROVIDED	DEAD WITHIN 24 HOURS	HOSP. INJURY WITHIN 24 HOURS	NON-HOSP. INJURY WITHIN 24 HOURS	TOTAL ACCIDENTS
2020	8	96	1074	1277
2021	9	166	2017	2389
2022	8	-----	-----	-----

Table 6. Summary statistics on road accidents involving PMVs in Spain in 2020, 2021 and 2022, differentiated by injury severity. Source: created by the authors with statistics provided by the DGT Observatory.

The comparative summary of the accidents under study in the whole of Spain compared to Malaga shows a great similarity as:

- The increase accounted for 87% of all road accidents in Spain, while in the city of Malaga it was 106%.
- 84% of these accidents resulted in minor injuries within 24 hours, a figure very similar to the 74% in Malaga.

To conclude this section, it is worth mentioning what is stated in the Road Safety Strategy 2021-2030 in terms of the micromobility of PMVs on urban roads, differentiating between the general and specific objectives, as well as the direct and indirect references to this type of vehicle in chapter 8 of the aforementioned document "Strategic Areas"(Ministerio del Interior, DGT, 2022, págs. 130-259):

- The overall objective for 2030 consists of "reducing the number of fatalities and serious injuries by 50% compared to the 2019 baseline". (Ministerio del Interior, DGT, 2022, pág. 122)
- Among the specific objectives for 2023, (Ministerio del Interior, DGT, 2022, pág. 123) we find that:

Vulnerable groups and means of transport are considered a priority due to their increasing presence in fatal and serious accidents, as well as the prospects of an increase in these modes of mobility: pedestrians and users of personal mobility vehicles, bicycles, mopeds and motorbikes. People over 64 years of age, and urban roads.

5.3 COMPARATIVE ANALYSIS WITH INTERNATIONAL STATISTICS FOR THE CITY OF LISBON

According to the Portuguese National Institute of Statistics (INE, 2022, pág. 1), Lisbon has a population of 544,851 inhabitants, very similar to that of Malaga, with 579,076 inhabitants.

In order to contrast the data of this study, statistical records of road accidents involving PMVs during the period from 2019 to 2022, specifically those involving electric scooters (in Portuguese, *trotineta*), were requested from the (PSP) of the city of Lisbon.

	MATERIAL INJURIES	MINOR	SERIOUS	DEATH	OVERALL
2019	23	55	2	0	80
2020	5	13	0	0	18
2021	18	75	3	0	96
2022	30	128	0	0	158
OVERALL	76	271	5	0	352

Table 7. Summary of road accident data involving electric scooters (trotinetas) in the city of Lisbon from 2019 to 2022. Source: created by the authors based on data provided by the Polícia de Segurança Pública of the city of Lisbon.

Comparing this data with that of Malaga during the same period, it can be seen that:

- The total number of road accidents in Lisbon (352) was lower than in Malaga (604), which means that 42% more accidents occurred in the capital of Malaga.
- The increase in road accidents between 2019 and 2022 was 97.5%, similar to the 106% increase in Malaga.
- Minor injuries in these accidents accounted for 77%, a figure very similar to that of Malaga, where they accounted for 74%.
- In both capitals, there have been no fatalities so far in road accidents involving electric scooters.

6. THE OPINION OF EXPERTS IN THE FIELD

In order to obtain a broader and more technical view of the subject matter of this study, and to serve as a complement to it, we considered it appropriate to obtain the opinion of a number of experts in the field, as well as of different actors who, in one way or another, are related to urban micromobility and PMVs or electric scooters.

In order to address the issue across as many disciplines as possible, interviewees were chosen from among people of recognised prestige in the political, police and health fields, including electric scooter users.

Below is a general summary of the respondents' answers for this study, which were common to all of them.

Regarding the following question:

In general, and from your point of view as a citizen, what is your opinion of PMVs in your city?

The answers were, in summary:

- It has been a breakthrough in urban mobility.
- It is a useful and sustainable means of transport.
- PMVs are here to stay.
- They pose a risk and are unsafe as they travel on pavements and in pedestrian areas.
- It requires time for adaptation, awareness and road training.
- They are reducing the presence of combustion vehicles in micromobility, making journeys more sustainable. They also take up little space, are easy to park and do not require any type of driving licence.

Regarding the following question:

With regard to the Road Safety Strategy 2021-2030, do you think it is feasible to reach the objective of reducing road accidents by 50% by 2030? Explain the answer from your professional perspective.

The answers were, in summary:

- It is possible but highly unlikely that that goal will be achieved given the idiosyncrasies and mentality of our governments.
- To achieve this goal, it is vital to improve legal regulation, enhance road infrastructure and increase road awareness campaigns.
- Similarly, it is necessary to act in a multidisciplinary way by drawing up a series of recommendations aimed at reducing road accidents, such as: more speed, breathalyser and drug controls, photo-red light systems, road safety audits, etc.

7. ANALYSIS OF THE RESULTS

After an analytical and objective study of each of the sections presented, the following results can be summarised.

Based on the analysis of all the national and local regulations mentioned in section I, and taking into consideration the opinion of the experts consulted on the subject, it can be stated that it is vitally important to improve the national regulatory framework and, consequently, the local framework. This would mainly concern the obligation to have civil liability insurance, set a uniform minimum age for riders throughout Spain and use protective helmets and reflective elements that improve the visibility of these vehicles. All of this is in the interests of guaranteeing road safety.

As a summary of section II and bearing in mind that Malaga has the largest number of two-wheeled vehicles in Spain, it can be stated that it would be imperative to have a larger number of staff than at present to be able to control and monitor the mostly improper behaviour of electric scooter riders, as detailed in the analysis of reported offences and the surveys and reports of insurers shown. On the other hand, it is also important to

establish and plan a series of specific preventive campaigns on compliance with traffic legislation for PMVs.

From the research in section III, together with the criteria of experts and users in the field, and with the aim of organising and pacifying urban traffic in order to guarantee road safety for all those involved and reduce the number of road accidents involving this clearly increasing micromobility, it can be stated that the current road infrastructure for PMVs in Malaga is deficient. Therefore, it is necessary to implement the projects that are currently being processed and to make more municipal investment in the short and medium term in this regard, thus responding to the social and road demand of a city with a superlative projection.

After carrying out the aforementioned comparative analysis in section IV, it can be stated that the number of road accidents involving this type of vehicle in Malaga has increased by 106% in the last four years, and it is vitally important to tackle this quantitative problem.

8. CONCLUSIONS AND PROPOSALS FOR IMPROVEMENT

8.1 CONCLUSIONS

The research carried out has shown that there is currently a problem related to PMV micromobility in Malaga in particular and in all the geographical areas studied in general. This is due to the increasing and disproportionate growth of both this form of mobility and the accidents in which these vehicles are involved. Therefore, it is advisable to adopt measures aimed at reducing the negative consequences of their use, in line with the road safety objectives set in the medium and long term by both the European and national authorities through the ESV (Spanish Road Safety Strategy) 2021-2030.

Bearing in mind that Spain generally regulates on the basis of the different social realities that coexist and that this type of urban mobility is still in development – around 5 or 6 years – it can be predicted that, as the Director of the DGT says, it will not be long until the national legislator addresses this issue, leaving local regulations to resolve less important matters.

As far as Malaga City Council and its Local Police Headquarters are concerned, given the current social, tourist, demographic and cultural relevance of the city, it is necessary to have an adequate number of police officers and suitable road infrastructure for the circulation of bicycles and/or electric scooters, in accordance with its urban potential.

	TOTAL ACCIDENTS % INCREASE	% MINOR INJURIES	% SERIOUS INJURIES	DEATH % TOTAL
MALAGA	106%	74%	26%	0.00%
SEVILLE	86%	60%	40%	0.25%
PROVINCES	87%	84%	16%	0.27%
LISBON	97.5%	77%	2%	0.00%

Table 8. Summary of total number of road accidents involving PMVs and injured people according to severity, in the geographical and temporal fields studied, expressed as percentages. Source: created by the authors with all the statistical data provided for the creation of this report.

The most significant conclusions are that the initial suspicion of this problem has had both a negative and a positive result. On the one hand, the total increase in road accidents involving electric scooters observed in all the geographical areas studied is concerning, but on the other hand, it is gratifying to note that the resulting injury of these accidents is low or minor, with a minimum number of fatalities, as shown in Table 8 above.

Similarly, having analysed the causality variables and types of accidents studied, and having heard the reflections of experts in the field, it is clear that if scooter riders do not require theoretical and practical knowledge of road traffic circulation, there are major and multiple disadvantages both for the riders themselves and for other road users, thus posing a risk to road safety in general.

Furthermore, it can be stated that there is a considerable quantitative problem of road accidents involving electric scooters and that the adoption of measures aimed at correcting the errors detected and referred to in this article would probably reduce both the number of accidents and their consequences, even if the results of these accidents are mostly minor given that these vehicles circulate at reduced or moderate speed if not manipulated.

8.2 PROPOSALS FOR IMPROVEMENT

Following the analysis of the results of the various parameters considered in this article, we propose adopting a set of national and local measures for PMVs whose implementation could lead to significant improvements in road safety:

- 1) Adapt and improve national legislation on traffic to the current social and road situation of these vehicles, regulating the obligation for drivers to have knowledge of traffic, to ride with a protective helmet and reflective elements that improve the visibility of the driver and the scooter, to have civil liability insurance that covers at least the basic guarantees and to have a minimum age for driving them.
- 2) Include a compulsory subject on road safety in the primary and/or secondary education system because, in one way or another, each and every person on this planet is a road user and it is therefore vital to have adequate road safety education and awareness for the sake of general well-being.

- 3) Incorporate a special campaign for the surveillance and control of electric scooters in urban areas, including all the actors involved in this type of micromobility, into the annual calendar of traffic campaigns published by the DGT, and include specific local campaigns in this regard, with due dissemination and communication through the different media.
- 4) Take advantage of existing mapping and geo-positioning technology to prevent and deter encroachment on pavements by these vehicles, using the corresponding "auto-off" in case of non-compliance.
- 5) Have a municipal census of private and rental types of these vehicles with the aim of obtaining more information on traffic flows, road demographics, usability, etc. in order to improve the local authority's capacity to respond and react, in terms of adapting urban mobility to the city's road situation.
- 6) Quantitatively and qualitatively strengthen road infrastructure in general to guarantee road safety in the circulation of this vulnerable group, increasing the number of kilometres and the quality of the cycle/PMV lanes and the 30 km/h lanes set up for this purpose, with priority given to these vehicles.
- 7) Carry out speed checks, with fixed and static speed cameras – on tripods and on vehicles – in 30 km/h lanes with priority for cyclists and electric scooter riders in order to offer greater guarantees to these users compared to other vehicles on the road, where they are at a clear disadvantage.
- 8) Intensify alcohol and drug controls, both during the day and at night, for electric scooter riders in certain areas where there is a high concentration of road accidents.
- 9) Reinforce the current cycling unit of the Malaga Local Police with the creation of a PMV police unit, advertise it with the same argumentation as the first one, develop all its police tasks with the convenience, ease and agility that these vehicles represent, and promote the image of acceptance of scooters as a great means of transport.
- 10) Regular monitoring and control of this matter in order to analyse the variations that the problem studied may present in its various facets, with special emphasis on those that may be due to the adoption of both national and local road measures that affect PMVs in Malaga.

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