

# Generation Y as a Catalyst for a Paradigm Shift in Urban Mobility

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## ABSTRACT

Most urban areas in developed countries today have structural mobility problems, exacerbated by the ineffectiveness of territorial governance policies and the lack of strategies to anticipate the environmental challenges triggered by climate change. Given the many uncertainties predicted for the near future, mobility is perhaps the quality that best represents contemporaneity. It represents the pressures and political challenges that will determine the living conditions of the next generations, as Henrik Hololei, Director General for Mobility and Transport of the EU, said in 2019 (Transport in the European Union – current trends and issues). To integrate the EU's plan to implement the Climate Neutral Mission and Smart Cities, which aims for inclusive, safe, resilient and sustainable cities and communities, this study focuses on a research strategy on the current urban mobility paradigm and emerging opportunities as society continues to shift to electric vehicles. According to Eurostat's November 2021 data, commuting to work is one of the main reasons for daily trips. Moreover, the car is the predominant mode of transport, used by less than 2 people per trip on average. Given this scenario, it is appropriate and urgent to redefine the status of the automobile and to orient a new vehicle design towards the expectations and values of the young and professionally active age group, between 25 and 45 years, referred to as Generation Y. These people do not find economic, safe and comfortable solutions compatible with their priorities and life expectations in the current commercial offer of own cars, shared mobility systems or public transport. For this reason, the authors believe it is appropriate to ask the following questions: – Will a typical passenger car with comfortable seating for 5 people, an average price of €32,000, mainly used by the driver, be compatible with the mobility expectations of a young generation in Europe? – Does the continued investment in increasing the range of electric vehicles make sense when most journeys are between home and work with an average distance of 10 km? – Will it be possible to increase the capacity of parking spaces without changing the existing infrastructure? – Will people with reduced mobility be able to drive autonomously and access the interior of the vehicle effortlessly? Given these challenges, this study converges in a research strategy that aims to analyze, reflect and design a user-centered vehicle for urban mobility that enforces the concepts of inclusion for people with reduced mobility, integrates the EU Sustainable Development Goals and gears the vehicle towards commuter trips. This context sets the stage for a radical innovation of the mobility paradigm that, despite recent technological advances, currently fails to meet the social, economic and environmental demands of contemporary society.

**Keywords:** Urban mobility, Commuting trips, Generation Y, Vehicle design

## INTRODUCTION

Urban mobility represents the movement of people and goods through motorized and non-motorized vehicles, to develop economic and social activities in the urban perimeter of cities, urban agglomerations and metropolitan regions, including the supporting infrastructure. The quality of mobility is intrinsically related to the articulation of urban mobility policies, such as transport, traffic, circulation, accessibility, urban development and land use, aiming to increase the efficiency and quality of the infrastructure, strengthen the economy and increase the standard of living of its citizens. Considering this concept of mobility and its interactions, this work focuses on the mobility of people traveling by motorized vehicles in urban centers at a short distance (less than 100 km).

According to data from the Passenger cars in the European Union (EU) study (Eurostat, 2022b), the number of passenger cars registered in the EU reached 250 million in 2020, an increase of 9.7% compared to 2015. Most drivers face stress from traffic and congestion, poor air quality and excessive noise, difficulty parking their cars safely and at an affordable price, and high costs of purchasing and maintaining their vehicles. Microcars, more fuel-efficient vehicles, lead exclusively to more compact structural solutions, with lower freight and passenger volumes with conditioned movements.

Using public transportation can mean a reduction in carbon dioxide emissions, but, despite its touted energy efficiency, few users are enthusiastic about public transportation, considering its inadequate coverage, excessive costs, long waiting times and low comfort as the main reasons for choosing the car. Motorbikes and soft mobility vehicles offer greater maneuverability in traffic and easy parking, but cold, damp and dark weather conditions make these uncomfortable and dangerous. Digital shared mobility platforms confirm greater efficiency in use, but are not economically feasible for daily commuting. Also, part of the population with reduced mobility, whether temporary or permanent, still finds in this alternative major access and comfort constraints due to the limited universality of use that characterizes autonomous and shared mobility. The study "Passenger mobility statistics" (Eurostat, 2021a) worsens the interpretation of this scenario by showing that the car is the dominant mode of transport in the EU, with an average of fewer than 2 persons per car per trip, and that commuting is the main reason for the daily distance traveled, in most cases between home and work and back.

A key factor to view this scenario with optimism is based on the expressive growth trend in the number of all-battery electric cars in the EU Member States. In 2020, the 1 million mark was exceeded for the first time, which is about 20 times higher than in 2013 and 3 times higher than in 2018 (Eurostat, 2022b). These data allow for the cautious prediction that electric drive technology will definitely replace polluting internal combustion engines, which is a clear contribution to mitigating climate change.

To meet the expectations of a young generation for the future, the EU Mission: Climate Neutral and Smart Cities (Directorate-General for Research and Innovation, 2022) is a new way to find concrete solutions to some of the biggest challenges, with ambitious targets to deliver tangible results by 2030.

It is in this spirit of Horizon Europe 2030 that this research interest and the greatest importance of the objectives proposed for this work come together.

## RESEARCH QUESTION

Considering that 9.7 million new passenger cars were sold in the European Union in 2021 (ACEA, 2022a), this seemingly positive economic data, on closer inspection, reveals some trends that could point to a worrisome scenario in the near future. Since 2019, sales have fallen by 25%, certainly exacerbated by the COVID-19 pandemic, but also by the crisis in the supply of raw materials triggered by the Russian invasion of Ukraine. Notwithstanding the degree of political instability experienced in all continents, the risk of escalation of the war, the socio-economic impact of the effects of climate change, and the uncertainty in the current period of economic inflation, which is affecting the economic dynamics of the automobile sales market, it is perhaps appropriate to add other variables to this equation:

- Will a typical passenger car, with a comfortable seat for 5 people, with an average price of €32,035 (Statista, 2022), used mainly by the driver, be compatible with the expectations of a young generation for a utility vehicle model?
- Are the persistent investments in increasing the range of electric vehicles, which seem to be demanded by potential buyers, reasonable when most journeys between work and home are over an average distance of 10 km (Eurostat, 2021c)?
- Will it be possible to increase the capacity of parking spaces without changing the existing infrastructure?
- Will people with reduced mobility be able to drive independently and access the passenger compartment of a car without having to leave the wheelchair?

Considering the relevance of reflecting on these questions, the following research question is summarised – *What is the appropriate urban mobility vehicle for the expectations and needs of Generation Y?*

## METHODOLOGY

This paper is part of an autonomous research conducted by the authors, which represents a convergence of personal interests and concerns shared by both, regarding cross-cutting issues related to the sustainability of mobility today. Considering that our society is going through a turning point in relation to the urban mobility paradigm, due to the generalized adoption of electrified propulsion systems by the automotive industry, and due to society's increasing demand for the impact represented by the mismatch between the car's capacity and the average number of occupants using the vehicles, reflections structured based on these topics are considered in this study. Besides these factors, others such as the stress caused by traffic, difficulty in parking, acquisition cost, taxes, car insurance and regular maintenance overhead are part of the lexicon that bases this research. Alternatives have also

been analyzed, namely public transportation and commuter systems, shared travel platforms, temporary vehicle rental systems, agile solutions for micro-mobility that are entering at a rapid pace almost all urban areas in developed countries, and even more recent phenomena of autonomous vehicles that may explore an innovative approach from the perspective of the service they offer, are also important considerations for this comprehensive study and condensed in this paper.

These reflections represent a refreshing approach, compared to traditional studies, because it is based on a double point of view that structures the path and the conclusions of the research, namely the convergence of two scientific areas that find in the interdisciplinary complementarity of Design and Engineering their greatest argument for differentiation.

The ultimate goal of this study lies in the possibility of designing a vehicle that meets the current and future environmental challenges, and the expectations of an age group that represents the main share of current car drivers and users of urban mobility platforms. It is also intended with this project to summon an alternative dynamic to the current industrial paradigm explored by car manufacturers, specifically by adopting lighter and more laconic manufacturing systems, adjusted to local production structures, with reduced carbon footprints and business models that decentralize the economic benefits of this activity and, in this way, add value and sustained progress at a local level. To establish this basis for reflection, statistical data are analyzed, reference authors are studied, the content of mobility journals is continuously evaluated, thematic events are visited, discussions are held with peers and organizations that are directly and indirectly involved with the issue of mobility, and, above all, everyday life is observed.

## **URBAN MOBILITY CHALLENGES**

Future challenges ahead include growing urban populations, how to build and maintain infrastructure, the economic and environmental costs of congestion, demands for greater accessibility and safety, and the question of how to improve air quality. These are some of the concerns expressed in the statement of the EIT (European Institute of Innovation and Technology, 2022), repeated by Henrik Hololei, EU Director General for Mobility and Transport, as transport activity across Europe is high and set to continue growing – estimates suggest that passenger transport will increase by 42% by 2050, and freight transport by 60%. This is good news for passengers and trade, but puts pressure on the transport network as well as the environment.

Much of this problem is because over 70% of EU citizens live in cities, which generate 23% of all transport greenhouse gas emissions (Eltis The Urban Mobility Observatory, 2021). This underlines the importance of efficient transport solutions that are adapted to the needs and expectations of communities in terms of mobility systems for people and goods, and that contribute to local and national competitiveness and economic development.

In the State of the Union Address on 16 September 2020, Ursula von der Leyen, President of the European Commission, presented the European Commission's ambitious proposal to increase the 2030 target for emissions

reduction to at least 55% (European Commission, 2020) and European Union rulers, aware of the need to invest in more efficient mobility solutions, have adopted the report “Guidelines for Developing and Implementing a Sustainable Urban Mobility” (Rupprecht et al., 2019), where they announce that, over the last few years, EU has seen major new developments in many areas of urban mobility. Due to new technologies, driverless electric vehicles may soon be on public roads, new business models provide “Mobility as a Service”, and simultaneously, changing attitudes among travelers increase shared mobility and cycling.

Given the range of possible interrelationships that arise from the concept of mobility, some variables are identified that denounce impacts with greater influence and for this reason also indicate a greater urgency for intervention. One of these variables concerns the transport sector in the economy, highlighted in the report “Transport in the European Union” (European Commission, 2019a). It states that this sector directly employs about 10.5 million people in Europe and accounted for about 9% of EU GDP and 9% of total employment in the EU in 2015.

The publication “Statistical Pocketbook 2018” (European Commission, 2018) also warns that the main external costs of transport are those linked to greenhouse gas emissions, local air pollution, congestion, capacity bottlenecks, accidents and noise. In particular, the significant impact of transport on energy usage and climate change must be addressed. In 2016, at least 33% of the final energy consumption and 24% of greenhouse gas emissions in the EU stemmed from transport.

Recent data (Directorate-General for Climate Action, Directorate-General for Energy and Directorate-General for Mobility and Transport, 2021) predict a recovery in energy use in transport during 2020–2025, driven by the recovery in activity following the COVID-19 pandemic. Energy demand from cars, responsible for more than half of the total final energy demand in transport in 2015, is projected to decrease considerably by 2050, due to notable energy efficiency gains brought by the introduction of CO<sub>2</sub> emission performance standards, the gradual renewal of the vehicle fleet, the emergence of advanced vehicle technologies and the increase in fuel prices in the long term.

The WHO (World Health Organization, 2022) alerts that, every year, around 7 million people die prematurely due to diseases related to air pollution worldwide. The news also mention that, along with air quality, noise pollution is another major preoccupation of cities. Invisible, yet dangerous, it can cause serious health issues, not to mention it also affects wildlife, being harmful to both humans and animals alike. Noise-inducing hearing loss is one such illness brought about by noise pollution – that is often associated with air pollution through, for instance, heavy traffic and traffic jams.

Another vector of the problem is stated in the Eurostat report (Eurostat, 2020b) “Majority commuted less than 30 minutes in 2019”, which mentions that more than half (61.3%) of employed people in the EU traveled less than 30 minutes from home to work. In comparison, one in four (26.3%) traveled for between 30 and 59 minutes, while less than one in ten (8.1%) employed had a commuting time of 60 minutes or more. This value is also compared to other regions outside Europe, as mentioned in the press release (United States

Census Bureau, 2021), namely the average one-way commute in the United States that increased to a new high of 27.6 minutes in 2019. The report also emphasizes that the longest average travel times were associated with various forms of public transportation, referring to workers who travel to work by bus having an average commute of 46.6 minutes.

Once the drive home to work is over, drivers usually face parking problems, as shown in a study by Ibrahim (Ibrahim, 2017), who states that car parking is a major problem in urban areas in both developed and developing countries. Following the rapid rise of car ownership, many cities are suffering from lacking car parking areas with an imbalance between parking supply and demand, which can be considered the initial reason for metropolis parking problems. This view is supported by Ashish Singh (Singh, 2021) who claims that, with the rapid growth of the metro cities worldwide, the parking generation rate goes on increasing very quickly, which creates major problems of parking in most of the urban areas.

Motorbikes are a mobility alternative to cars that can significantly reduce parking space occupancy. However, although they are more maneuverable in traffic and make parking easier, they are also associated with high accident rates. According to the European Road Safety Observatory (Nuyttens, 2020) 15.5% of all road fatalities in the EU27 in 2018 were motorcyclists. Apart from the safety indicators, these vehicles are also uncomfortable when used in precipitation, very low temperatures, or strong winds.

A new phenomenon that has definitely taken hold in cities is the concept of micromobility. According to the “Porsche White Paper” (Porsche Consulting, 2019), over the previous two years, innovative micromobility services have drastically reshaped the urban landscape of countless metropolitan areas across the globe and contributed to the future of passenger mobility. Considering that the average traffic speed in some of those cities is around 15 kilometers per hour (Heineke et al., 2019) it can be frustrating to travel by conventional means of transportation, such as by bus, shared or private car. This phenomenon makes the use of micromobility vehicles much more desirable, as roughly 60% of car trips are less than 8 km, and thus could benefit from micromobility solutions. However, they also come with various problems that the cities and also clinicians must face (Choron and Sakran, 2019). The sudden expansion created problems, both for the users, and the cities in general, leading to chaos. Scooters suddenly appeared in many cities, triggering complaints of clutter and blocked sidewalks (McFarland, 2019), but one of the main problems is accidents. The numbers suggest a big rise in emergency rooms by riders and pedestrians, with injuries caused by electric scooters in Brisbane, Australia. Not wearing helmets, traveling at more than 30 km/h, and alcohol consumption were identified as significant factors in e-scooter accidents (Haworth & Schramm, 2019).

Adherence to this typology of maneuverable vehicles finds the greatest argument for seeking light mobility solutions in the characterization of most of their users’ journeys, considering that the number of urban trips of less than 100 km within the same urban area represents a substantial proportion of daily short- distance mobility according to the article Passenger mobility statistics (Eurostat, 2021b). The same article also presents other very relevant

data for mapping mobility by stating that commuting is the main reason for the daily distance covered: between 27% in Germany and 47% in Croatia of the daily distance travelled is for work. In most cases, this is the distance between home and the workplace and back. For urban mobility, regardless of the day (work or non-work), the private car is mostly used (as a driver or as a passenger) in all the 13 Member States covered, a fact that justifies the statistic that, for the population aged 15–84, the average occupancy rate for a passenger car used in urban trips is generally between 1.20 and 1.90 persons.

According to the European Court of Auditors' Special Report (Auditors, 2020), the European Platform for Mobility Management based on audit work carried out in eight cities in Germany, Italy, Poland and Spain, the Court of Auditors found that there is no evidence that cities are fundamentally changing their strategies and that there is a clear tendency to promote more sustainable modes of transport. The modal split data provided by cities and the information collected in the cities visited show that there is a significant risk that the increase in active mobility, such as cycling and walking, will result from changes that originate in public transportation rather than in the use of private vehicles.

## **GENERATION Y AS A CATALYST FOR CHANGE**

The 25–45 age group – known as Generation Y – is an expressive community, professionally and environmentally active. that values family well-being, longer-term financial futures, career prospects, and day-to-day finances (Savage, 2020). They face the aforementioned urban mobility issues, compounded by the fact that they are not seen in the symbolic value attributed to the car, which is typically considered masculine and an indicator of class and social status (Mattioli et al., 2020).

The challenges of urban mobility can be particularly worrying. According to the report “Being young in Europe today – demographic trends” (Eurostat, 2020a), Generation Y represented 26.2% of the population of the 27 EU Member States in 2019. The study “Generation Y: Lifestyles and Mobility Choices of Millennials in California, and the Motivations behind Them” (Berliner et al., 2015) characterizes this generation as a very active segment of the population, increasing economic power, often preferring urban locations and social lifestyles, while the focus is mainly on the urban population. The study also highlights some “Potential Factors Affecting the Mobility of Millennials”, such as recession, auto costs with gasoline, auto insurance, environmentalists, less materialism, delayed marriage and fewer children. This is also corroborated in a more recent study from 2020, the “Deloitte Global Millennial Survey 2020 Resilient Generations” (Savage, 2020). This study holds the key to creating a “better normal”, stating that the family, financial future, and job prospects remain the primary sources of stress in Generation Y. It is also emphasized in the article that, globally, millennials before the pandemic said they were saving or investing almost 40% of their disposable incomes. Fewer than a quarter had personal loans, and only 20% had mortgages. On average, 10% of millennials reported still having student loans,

though, in some countries, up to 40% had yet to pay off their balances, considering having enough money to pay the bills is a long-running cause of stress for many, but especially acute for millennials, concludes the article.

Considering that the average monthly cost of driving a car varies hugely across Europe – from €743 a month in Greece to €1,138 in Switzerland (LeasePlan Corporation, 2021) –, the Eurostat study (Eurostat, 2021a) illustrates the financial effort an active young person must make to buy a new car, considering that ten Member States located in the east of the EU had minimum wages below €700 per month. In five other Member States, located mainly in the south of the EU, minimum wages ranged between €700 and just over €1,100 per month.

Despite the difficulty reported by the younger generation in acquiring a new vehicle, 9.7 million new passenger cars were sold across the European Union in 2021 (ACEA, 2022b). According to the International Organization of Motor Vehicle Manufacturers, global passenger car numbers now approach one billion (OICA, 2021), and their size and average horsepower has continuously grown.

## **DESIGN GUIDELINES**

Given this scenario, it is considered opportune and urgent to redefine the status of the automobile and to align its design with the expectations and values of the young and professionally active age group Generation Y. These represent current mobility needs and responding to their desires can contribute to the affirmation of a new inclusive mobility paradigm that integrates clean and emerging technologies into a circular economy. This challenge is also an opportunity to design a vehicle that takes up less space and is consistent with municipal policies on land use, environment, energy, transport, and road safety, without compromising on comfort and loading capacity. This context also sets the stage for a radical innovation of the mobility paradigm, which, despite recent technological advances, currently fails to meet the social, economic, and environmental demands of today's society.

The challenges for urban mobility raised by this study lie in the conceptual formulation of a vehicle that is designed based on the needs of users in line with European policies of energy transition, conservation and protection of natural resources, that meets current road safety requirements, that is integrated into a constructive logic of low environmental impact, and that is economically accessible to a critical and demanding public that privileges happiness and conscious consumption.

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