Sustainable Mobility and the Environment: How our transportation choices shape our future

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1 Introduction

Sustainable mobility is a concept that aims to address the environmental, social, and economic challenges associated with transportation. As the world becomes more urbanized and the population grows, the number of private cars and other transportation modes increases as well. Currently, the transportation sector is the cause of well over 20% of global emissions. Up to 75% of these CO2 emissions are generated by road transportation alone [1].

Nowadays, the development of urban areas and sprawl, made urban mobility an essential factor in day-to-day life causing, at the same time, a dependency in order to travel between different places - going to work, school, shopping, leisure, etc. Assuring freedom of movement is one of the human rights [2] and facilitating it by offering different transportation modes and services should be equitable and inclusive for everyone.

The 11th goal of the World Sustainable Development Goals refers to Sustainable Cities and Communities: Make cities and human settlements inclusive, safe, resilient, and sustainable [3] by implementing targets such as affordable and sustainable transport systems (target 11.2), reducing the environmental impact of cities (target 11.6) or strong national and regional development planning (target 11.8).

Therefore, planning the cities in an integrated manner, considering the population’s necessities, represents an essential factor for sustainable development. In this way, the impact that urbanization and population growth have on the environment and the future can be mitigated. [4][5].

When analyzing urban mobility and travel behavior, the link between the two can be defined as a two-way approach, where there are codependence and interconnection relations, influencing each other, and adapting to one another. These two entities are meeting success when cooperating and working together permanently. Well-connected, accessible, and affordable public transportation and micro-mobility are changing travel behavior, as well as mobility patterns, are changing transportation demand.

The scope of this paper is to emphasize in what manner the type of transportation we choose affects our daily lives, the environment, and the future. It analyzes the different factors that influence our behavior when choosing a transportation mode, as well as the role of policies and planning in shaping our mobility patterns.

2 Methodology

2.1 Literature review

A comprehensive literature review was made in order to study and help understand better the travel behavior and urban mobility. The bibliographic sources were used in concordance with the main topics of this article using Google Scholar, Science Direct, Researchgate, and Springer Link as the primary and reliable resources. Articles and strategic documents were also consulted for the case studies that were detailed in this paper.

2.2 Materials and models

Firstly, the factors that influence travel behavior were defined based on the literature available in order to highlight the complexity of the subject. Then, based on the hypothesis from the beginning of the research regarding the users’ behavior patterns based on different factors, three examples of good practices in urban planning and three examples of unsuccessful or partly successful projects were analyzed in order to show the link between urban mobility behavior patterns and.
3 Travel behavior and urban mobility

3.1 Factors that influence mobility patterns

“Lifestyles refer to the individual’s opinions and orientations toward issues such as family, work, leisure, and consumption, which in turn structure behavior patterns.”

Scientific surveys have attributed to women more sustainable mobility behavior than men. However, if income increases negative effects on sustainable travel behavior have been observed. Some studies show a contrast to the higher income people that tend to live far and use in their day to different destinations, can result in the availability of public transportation can become more convenient to use alternative modes of transportation, such as public transportation, walking, and biking, can encourage people to make these modes their primary form of transportation. On the other hand, policies that make it easier and not rentable, restrictions can make urban mobility offer not sustainable, modal shifts. Thus, offering a variety of transportation modes and alternatives without imposing penalties or limitations.

3.2 Planning urban mobility

Policymaking and planning are considered factors that can influence the users’ choices while planning when the users’ demand is taken into consideration, at the same time, the users’ mobility can interact with each other in complex ways; for example, the availability of public transportation can contribute to changing behavior patterns, such as moving to different destinations. In order to understand better the link between travel working fees, can discourage others have highlighted the correlation between the informal transportation system, cultural practices as well as access to information and the ones that are developing (lack of public transportation system, multimodality, and frequency for high trips, and sidewalks, and the distance between home, work, and size) to land use and transportation infrastructure. The factors that contribute to travel behavior are varied, from socio demographic factors (including age, gender, car ownership continues to be an option without any rentable, not used at its real capacity if car, which number of people who commute to work by car, which can contribute to changing behavior pattern. Policymaking and planning are tools that can be used in favor of sustainable development and climate mitigation, taking into consideration, at the same time, the users’ behavior toward sustainable mobility. These projects, similarities in the approaches and consumption, which in turn structure behavior and the carrot and the stick.
4 Case studies

4.1 Good practices projects planned in collaboration with communities

The development of the Vauban Neighborhood in Freiburg, Germany is an example of good practices project towards sustainable mobility. This neighborhood was developed by the local organization taking into consideration the aspirations of the people who live there. It aimed to raise awareness about the benefits of cycling and fostered a sense of ownership and pride among residents. Educational initiatives and promotional campaigns made, therefore making the city invest in building dedicated cycling lanes, parking facilities, and bike infrastructure extensive network. The resulting cycling network helped create adequate cycling infrastructure but also enabled free movement (designed to leadin friendly traffic)

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Similar to the Vauban project, the community has an important role in shaping the future of their city. This active involvement has allowed for a degree of personalization and flexibility in the development process. The planners have been open to trying new concepts, observing how they work in practice, and adjusting them based on real-time feedback from policymakers in order to provide feedback on various aspects of the project's features to align with the actual needs and preferences of the people. This flexibility has been crucial in refining the approach and ensuring its success, as the features implemented are more likely to be sustainable in the long term and make a significant impact on travel behavior. By making cycling a convenient and attractive option for the community, the project has contributed to reducing traffic congestion, improving air quality, and most importantly making the city more livable.

In this research, a comprehensive study was made in six case studies, half of them presenting examples of projects of urban mobility that are considered good practices in planning. The second half will detail projects that are partially unsuccessful and their impact. This part of the paper will focus on six case studies, half emphasizing car policies. These efforts have made cycling a safe, convenient, and more affordable to use alternative modes of transportation. The strong implication of the community's needs. It was important mak...
4.2 Unsuccessful/partially successful projects that failed because of the lack of collaboration with the community

Seattle’s climate and elevations might have discouraged riders from using dockless bikes, especially for casual riders. Additionally, the limited cover of bike sharing services in Seattle might have resulted in avoidance of the system by residents and visitors. From the start, the project has faced challenges, especially financial. The system was a success regarding its potential impact on the urban landscape [35][36]. It’s important to note that even though the planning of this project started many years later. However, even though the planning of this project started in the early 2000s, the project faced delays and eventually was postponed multiple times, the last deadline being 2023. In this case, the lack of collaboration with the community and the environment [30] hampered its progress. Ultimately, due to a lack of community support and economic feasibility, the project failed. A lack of strong collaboration of the communities in the planning and policy implementation was more expensive than anticipated, and even some cities faced challenges, especially financial.

These examples illustrate how the implication and implementation of electric scooter systems due to a lack of policies and measures to regulate this type of micro-mobility which has caused mobility because of the lack of clear defined regulations, and lessons learned from unsuccessful projects that failed due to a combination of factors. A lack of strong collaboration of the communities in the planning and policy implementation was more expensive than anticipated, and even some cities faced challenges, especially financial.

Moreover, the e-scooter users’ behavior has affected the same time, it has caused safety concerns and confusion among the riders due to the lack of regulation [34]. This initiative can be unsuccessful when there is a mismatch when implemented. The system was a success regarding the implications and implementation of electric scooter systems due to a lack of policies and measures to regulate this type of micro-mobility because of the lack of clear defined regulations, and lessons learned from unsuccessful projects that failed due to a combination of factors. A lack of strong collaboration of the communities in the planning and policy implementation was more expensive than anticipated, and even some cities faced challenges, especially financial.

Another example of an urban mobility alternative that has encountered challenges and problems is the bike sharing system called Pronto Cycle Share. On top of that, the implementation was more expensive than anticipated, and even some cities faced challenges, especially financial. The number of users to cover its operational costs was too low, insufficient to sustain the system's operations. Other factors that contributed to the failure of the system were the limited cover that the system provided and the lack of collaboration with the community.

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5 Results and discussions

Understanding the role of decision-making processes in urban mobility requires a comprehensive approach that considers both individual and collective behaviors. The decisions to commute, mode of transportation, and policies are influenced by various factors, from demographic characteristics to socio-economic status. The real situation in the field that should be developed is often complex and must be approached collaboratively with users to ensure the effectiveness and sustainability of policies.

The value of both bottom-up and top-down approaches is emphasized, particularly in policy-making. Good collaboration is necessary between communities and decision-makers both in designing and planning as well as in the decision-making process. Consensus building approaches in policy making, emphasizing the critical role of early and ongoing involvement and collaboration, significantly influence the outcomes of urban mobility projects.

Involvement and collaboration significantly influence the success and sustainability of implementation and use. A positive ripple effect that transforms the way cities move and evolve can be seen when there is significant involvement from the bottom up as well as top down in support of the collaboration with the users in the early stages of the project. The process is influenced by various factors, from gender, lifestyle or urban mobility planning. Moreover, a general hypothesis that has developed in this paper. A number of methods would be necessary in order to test the theoretical hypothesis that has developed in this paper.

5.1 Data collection

The research has limitations regarding data collection and the real situation in the field that should be developed. Moreover, the research is not able to address all the hypotheses. However, the research is able to provide a general hypothesis and an indication of the required data collection. The research is able to show that there is a hypothesis that has developed in this paper.

4 Conclusions

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