# Sustainable Transportation Planning In College Campuses

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Abstract- Sustainable transportation planning on college campuses is a critical aspect of creating environmentally socially inclusive, and economically friendly, viable communities. This paper explores the current state of sustainable transportation on college campuses, focusing on the promotion of walking, bicycling, and public transit as alternatives to single-occupancy vehicles. Drawing on case studies from Kent State University, the University of Florida, and other institutions. this research examines the opportunities and challenges in implementing sustainable transportation policies. The paper highlights the importance of infrastructure, student attitudes, and institutional policies in fostering a modal shift towards more sustainable transportation options. Recommendations are provided for universities to enhance their transportation systems, reduce environmental impacts, and improve the quality of life for students, faculty, and staff.

*Keywords*- Sustainable transportation, college campuses, public transit, cycling, electric vehicles, mobility solutions, sustainability.

# I. INTRODUCTION

College campuses are unique environments that serve as microcosms of larger urban areas. They are characterized by high population densities, diverse land uses, and a mix of residential and academic activities. As such, they present both challenges and opportunities for sustainable transportation planning. The increasing reliance on automobiles for campus commuting has led to congestion, pollution, and the degradation of the campus environment. In response, many universities are adopting Transportation Demand Management (TDM) strategies to promote walking, bicycling, and public transit.

This paper aims to provide an in-depth analysis of sustainable transportation planning on college campuses. It begins with a

review of the literature on sustainable transportation and TDM strategies. The paper then presents case studies from Kent State University, the University of Florida, and other institutions to illustrate successful practices and challenges. Finally, the paper offers recommendations for universities to enhance their transportation systems and promote sustainable commuting options.

# **II. LITERATURE REVIEW**

A. Sustainable Transportation and TDM

Sustainable transportation refers to systems that meet current mobility needs without compromising the ability of future generations to meet their own needs (Black, 1997). TDM strategies are a key component of sustainable transportation planning. These strategies aim to reduce the reliance on single-occupancy vehicles by promoting alternative modes of transportation, such as walking, bicycling, and public transit (Litman, 2003).

TDM strategies can be categorized into positive, mixed, and negative measures. Positive measures include expanding transportation options, such as improving transit services and creating pedestrian and bicycle-friendly infrastructure. Mixed measures target specific user groups, such as carpooling programs and park-and-ride facilities. Negative measures involve reducing options or increasing costs for driving, such as parking restrictions and pricing (Litman, 1999).

# B. The Role of College Campuses

College campuses are ideal environments for implementing TDM strategies. They have a captive audience of students, faculty, and staff who are often open to alternative transportation options. Additionally, universities have control over their land use, infrastructure, and transportation policies, allowing them to experiment with innovative solutions (Balsas, 2003). Research has shown that universities can influence long-term transportation behavior. Students who are exposed to sustainable transportation options during their college years are more likely to adopt these practices in their post-graduation lives (Tolley, 1996). Therefore, universities have a unique opportunity to shape the transportation habits of future generations.

## **II. CASE STUDIES**

Kent State University

Kent State University, located in Kent, Ohio, provides a case study of the challenges and opportunities in promoting sustainable transportation on a large campus. A study conducted by Kaplan (2015) found that walking and bicycling levels among students were generally low, with bicycling being particularly underutilized. The study identified several barriers to sustainable transportation, including time constraints, convenience, and inadequate infrastructure.

A survey of 668 students revealed that 86% had access to a vehicle, and most students relied on singleoccupancy vehicles for commuting. The study also found that existing infrastructure discouraged walking and bicycling, with poor sidewalks, lack of crosswalks, and unsafe road conditions being major impediments.

Despite these challenges, the study highlighted opportunities for improvement. Students expressed a willingness to walk or bicycle if infrastructure were improved. Recommendations included enhancing pedestrian and bicycle facilities, improving snow removal, and providing better lighting and signage.

Data-Driven Analysis of Campus Transportation Patterns



Figure 1Mode of transportation in the campus

As a result ,the use of all three modes of transportation is lowest in the afternoon.

#### University of Florida

The University of Florida (UF) in Gainesville offers a successful example of sustainable transportation planning through its partnership with the local transit system. UF provides over \$5.2 million annually to enhance transit services, resulting in a 284% increase in ridership between 1995 and 2003 (Bond & Steiner, 2006).

UF's TDM program includes parking restrictions, parking pricing, unlimited-access transit, and transit service improvements. The university has also implemented a Transportation Access Fee, which funds transit enhancements and provides students with unlimited access to bus services. This program has been highly effective in reducing automobile use and promoting public transit.

The success of UF's TDM program can be attributed to its comprehensive approach, which combines infrastructure improvements, financial incentives, and policy changes. The university has also engaged students in the planning process, ensuring that their needs and preferences are addressed.

### Sinhgad College Campus Lonavala

This case study explores sustainable transportation planning at Sinhgad College Campus, Lonavala, through a survey conducted via Google Forms. The study aims to understand transportation patterns, barriers to sustainable transportation, and potential improvements to create more ecofriendly campus.

With increasing concerns over environmental sustainability, higher education institutions play a crucial role in promoting eco-friendly transportation solutions. This study examines the commuting habits of students, faculty, staff, and visitors at SinhgarhCollege Campus, Lonavala, to identify sustainable transportation challenges and opportunities. The research was conducted through a structured survey distributed via Google Forms, collecting quantitative and qualitative insights.

<u>Methodology</u>: A structured questionnaire was designed to gather data on transportation preferences, challenges, and potential improvements. The survey was distributed electronically to a diverse group of campus stakeholders, ensuring comprehensive feedback. The responses were anonymized and analyzed using statistical tools to derive key findings.





Lack of safe infrastructure ,weather conditions and far distance are the major issues faced by SITL students .

The survey results indicate that a significant portion of the campus population relies on private vehicles, leading to higher carbon emissions. However, there is strong support for sustainable transportation options if infrastructure is improved. The key recommendations include:

1. To promote sustainable transportation, several initiatives can be implemented. Enhancing bicycle and pedestrian infrastructure is crucial, which includes developing safe bike lanes, secure parking, and well-maintained sidewalks. Improving public transit connectivity is also essential, focusing on increasing frequency, affordability, and route optimization. Additionally, promoting carpooling and ridesharing can be achieved by introducing incentives such as reduced parking fees for carpool users. Raising awareness and engagement through programs highlighting the benefits of sustainable transportation can also encourage participation. Finally, encouraging e-mobility by installing more EV charging stations and promoting e-scooter and e-bike rentals can further support a sustainable transportation system. By implementing these measures, a more environmentally friendly and efficient transportation network can be created.



Figure 3 Primary mode of Transportation

## **Other Institutions**

Other universities, such as the University of California, Davis, and the University of Wisconsin-Madison, have also implemented successful sustainable transportation programs. These institutions have invested in bicycle infrastructure, such as bike lanes, paths, and secure parking facilities. They have also promoted walking through pedestrian-friendly campus designs and traffic-calming measures.

These case studies demonstrate that sustainable transportation planning on college campuses requires a combination of infrastructure improvements, policy changes, and community engagement. Universities must address the unique needs of their populations and create an environment that supports alternative transportation options.



Figure 4 Affecting factors

This Bar Chart shows the factors influencing the choice of transportation – Time efficiency is most affecting factor

#### **III. DISCUSSION**

Barriers to Sustainable Transportation

Despite the potential benefits, several barriers to sustainable transportation on college campuses exist. These include:

Several challenges hinder the adoption of sustainable transportation on college campuses. Infrastructure deficiencies, such as poor sidewalks, lack of crosswalks, and unsafe road conditions, discourage walking and bicycling, while inadequate bicycle parking and storage facilities limit the use of bicycles. Additionally, many students perceive walking and bicycling as inconvenient or time-consuming, and weather conditions in colder climates further deter active commuting. The availability of underpriced parking and ample parking spaces on campus also encourages automobile use, providing little incentive for students to switch to alternative modes. Furthermore, implementing sustainable transportation initiatives requires significant financial resources, which can be a challenge for universities facing budget constraints, limiting their ability to invest in infrastructure and programs. Addressing these challenges is crucial to promoting sustainable transportation creating and а more environmentally friendly campus community.

#### **Opportunities for Improvement**

To promote sustainable transportation on college can several initiatives be implemented. campuses, Infrastructure improvements can be made by enhancing bicycle infrastructure, pedestrian and including the construction of sidewalks, crosswalks, and bike lanes, as well as providing secure bicycle parking and storage facilities. Policy changes can also be introduced, such as implementing parking restrictions and pricing to discourage automobile use, while offering financial incentives to students who opt for alternative transportation options. Community engagement is crucial, involving students, faculty, and staff in the planning process through surveys and focus groups to understand their needs and preferences. Education and promotion efforts can also be made to raise awareness about the benefits of sustainable transportation, including organizing events like "Bike to Work Week" and providing information on alternative commuting options. By implementing these measures, colleges can reduce their environmental impact, promote a healthier lifestyle, and create a more sustainable community.

## Recommendations

To promote sustainable transportation, it's essential to adopt a multi-faceted approach. Increasing funding for sustainable transport projects can help drive innovation and infrastructure development. Implementing awareness campaigns can encourage behavioral shifts, educating the public about the benefits of eco-friendly transportation options. Strengthening partnerships with local government agencies and private transport providers can also enhance transportation networks, fostering collaboration and resource sharing. Finally, utilizing data-driven planning tools can optimize transportation networks, improving efficiency and reducing environmental impact. By combining these strategies, cities can create a more sustainable, efficient, and environmentally friendly transportation system.

### **IV. CONCLUSION**

Sustainable transportation planning on college campuses is essential for creating environmentally friendly, socially inclusive, and economically viable communities. Universities have a unique opportunity to influence the transportation habits of future generations and promote sustainable commuting options.

The case studies of Kent State University, the University of Florida, and other institutions demonstrate that successful sustainable transportation planning requires a comprehensive approach. Universities must address infrastructure deficiencies, implement policy changes, engage the community, and promote alternative transportation options.

By adopting these strategies, universities can reduce their environmental impact, improve the quality of life for students, faculty, and staff, and contribute to the broader goal of sustainable development.

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