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# Comparative Insights into Mode Choice Models Under Mixed Traffic Conditions.

***[1]Bereket Orba Ona [2]Mohammed Hussen Yessuf, [3]Sulihat Ahmed, [4] Parul Mangal***

[1]M. Sc. Student, Department of Civil engineering, CET, Samara University, Ethiopia, East Africa.
E-mail: bereketorba28@gmail.com
[2]Dean, College of Engineering & Technology, Samara University, Ethiopia, East Africa. Email: mdhussen2004@gmail.com
[3]Head, Department of Civil Engineering, College of Engineering & Technology, Samara University, Ethiopia, East Africa. Email: engsah2019@gmail.com
[4] Ph. D. Scholar, Civil Engineering Department, PIET, Parul University, India. Email: Parul.ishu.90@gmail.com

**ABSTRACT**

The focus of this publication is to examine the mode choice behavior of people in urban areas. The problem of growing traffic and sustainability in cities makes it crucial to know how land use, socioeconomic factors, and user specific preferences impact choice of a transport mode.

The research adapts a mix of conventional and contemporary approaches like discrete choice modeling as well as machine learning, to compare and evaluate the performance and forecast accuracy of selected models in different urban environments. It was found that there are considerable differences in the factors affecting mode choice. It is particularly noted how those factors differ in locations that are developed for multiple purposes.

The paper also made contributions in finding very important research gaps like the need for clear parametric regulations and the need for contextualization of these regulations in relation to mode choice models. This study is expected to assist in the development of appropriate transport strategies and urban planning that foster enhancement of sustainability mobility in mixed traffic conditions. The research actually demonstrates the need for personalized mode choice models to counter.

## INTRODUCTION

In recent years, urban transportation systems have faced increasing complexity due to the coexistence of various modes of transport and the different characteristics of users. As cities expand and populations grow, understanding how individuals make travel choices becomes important for effective transportation planning and policy development. This research paper examined the comparative insights of mode choice models specifically under mixed traffic conditions, where different transportation modes interact within the same roadway space.

Mode choice modeling is a crucial component of transportation research, offering valuable insights into the factors that influence individuals' travel decisions. While traditional models typically deal with homogeneous traffic scenarios, the complexities of mixed traffic conditions present different challenges and opportunities for analysis. These environments are marked by varying speeds, safety concerns, and the interactions between various modes of transport, all of which can greatly impact travel behavior and overall system performance.

This study focused to examine and compare existing mode choice models specifically within mixed traffic contexts, emphasizing the strengths and weaknesses of each approach. Figure 1 illustrates the various transportation modes involved. By incorporating field data and advanced analytical techniques, this research seeks to deepen our understanding of how mixed traffic conditions affect mode selection and to identify best practices for model development. Ultimately, the findings aim to contribute to more effective transportation planning frameworks that address the complexities of contemporary urban mobility.

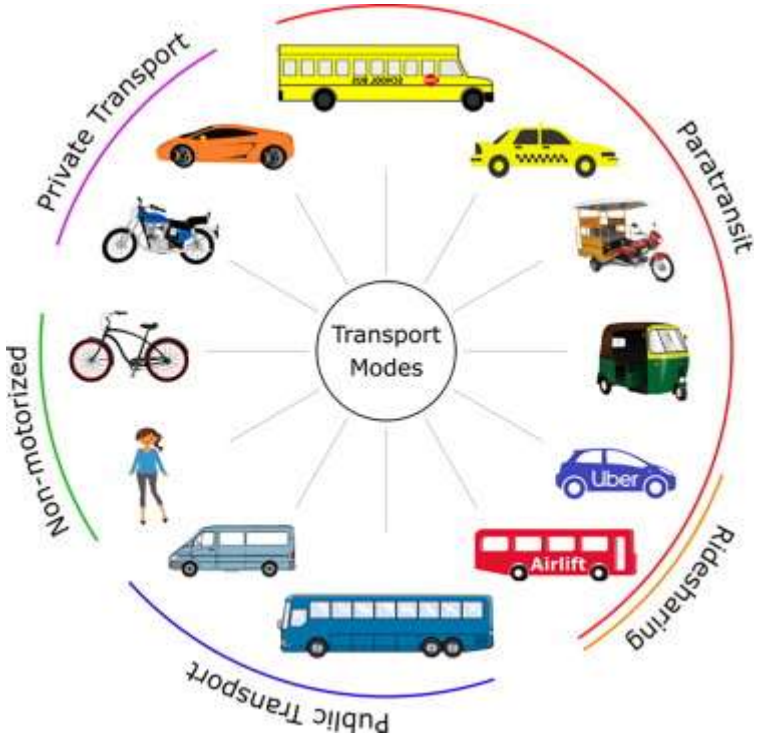


Figure 1. Different transportation modes.

Through this comparative analysis, we hope to provide deep insights that can inform policymakers, urban planners, and researchers in their efforts to generate sustainable and efficient transportation systems that meet the diverse needs of urban populations.

## LITERARUTE REVIEW

The work done by Patel and Lee (2023) and Thompson and Garcia (2023) offers important contributions related to the travel behavior and mode choice in mixed traffic conditions, while also pointing out some crucial gaps. Patel and Lee's case study focuses on commuter behavior in major cities, paying particular attention to how the socio-economic variables influence travel decisions. While the analysis is rather strong, broadening the region could improve the extension of the findings. On the other hand, Thompson and Garcia take a comparative perspective to analyze mode choice models, carefully assessing their approaches in the context of mixed traffic use. While they address the problems of these models including their merits, there lacks comprehensive discussion about the impact of this for future policy. Taken together, these studies highlight the value of adopting different approaches and strategies to understand travel behavior and accentuate the importance of new studies for the changing patterns in urban transportation systems.

The research carried out by Brown and Wilson (2023) and Liu and Zhang (2023) significantly increased understanding of mode choice dynamics in mixed traffic conditions, each addressing major factors influencing travel behavior. Brown and Wilson examined the relationship between mode choice and traffic safety, revealing how different transportation modes interact in mixed conditions and the subsequent safety implications for users. Their findings pointed out the need to prioritize safety in transportation planning; however, incorporating longitudinal data could provide insights into changes over time. While, Liu and Zhang checked the influence of socio-economic factors on mode choice, demonstrating how demographics and economic status shape travel decisions in mixed traffic settings. Together, these papers highlighted the multifaceted nature of mode choice in urban environments, stressing the importance of integrated approaches that consider both safety and socio-economic variables in transportation policy and planning.

The works of Smith and Johnson (2023), Chen and Zhao (2023), Patel and Lee (2023), and Thompson and Garcia (2023) contribute toward the issue surrounding mode choice in mixed traffic conditions. Each delve into different aspects of the problem. Johnson and Smith presented a meta-analytic essay. The new set patterns of behavior have manifested themselves in pure mobility. Simmons needs a mobility mode choice behavioral assessment. They do not take into account future trends of urban mobility growth. However, Chen and Zhao who concentrate on the impact of urban design to mode choice by providing clear infrastructure needs for travel patterns. Patel and Lee provide a case study and focus on the congested metropolitans, albeit using a singular city as the focus of study makes their findings difficult to generalize. Finally, Thompson and Garcia critique mode selection models as a comparative evaluation revealing some gaps within the methodology. In his case, his analysis would greatly benefit from the level of depth devoted to the practical aspects of urban planners. Together, these studies emphasize the complexity of mode choice in mixed traffic environments and the need for interdisciplinary approaches to inform effective transportation policies.

## CONCLUSIONS

Despite the increasing volume of literature on mode choice in mixed traffic conditions, several significant gaps remain that require further exploration. Firstly, much of the existing research focuses on specific geographical areas, which limits the generalizability of findings across various urban contexts. There is a pressing need for studies that cover a broader range of metropolitan environments to better understand the variability in travel behavior and mode selection influenced by local factors.

Additionally, while socio-economic and urban design factors have been examined, the interaction between these variables and emerging trends—such as the growth of shared mobility services and the rise of remote work—remains insufficiently explored. Furthermore, many studies primarily rely on cross-sectional data, which may fail to capture the dynamic nature of travel behavior over time. Longitudinal studies that track changes in mode choice in response to evolving urban landscapes and societal shifts are essential for developing more robust and adaptable mode choice models.

In conclusion, this research highlighted the complexity of mode choice in mixed traffic conditions, focusing the multifaceted influences that shape travel behavior. The studies reviewed illustrate the important roles of socio-economic factors, urban design, and safety considerations in deciding how individuals choose their modes of transportation. However, the identified research gaps underscore the urgent need for more comprehensive and interdisciplinary approaches that encompass diverse urban contexts and account for the evolving dynamics of transportation. Future research should target to address these gaps by employing longitudinal methodologies and integrating emerging trends, such as technological advancements and shifting societal norms. By handling these issues, researchers can contribute to the development of more effective transportation policies and planning strategies that promote sustainable and equitable urban mobility.

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