

THE DYNAMICS IN TRAFFIC DATA MODELLING FOR A PAVEMENT DESIGN: OPPORTUNITIES AND CHALLENGES

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OUTLINE

Introduction

History Of Traffic Data Collection

Goals of Traffic Data Modelling for Pavement Design

Traffic Modelling Techniques and Softwares

Usefulness of Traffic Data Modelling for
Pavement Design

**Advantages of Traffic Data
Modelling for Pavement Design**

Opportunities in Traffic Data Modelling

Challenges in Traffic Data Modelling

Future Direction and Innovations

Successful Traffic Engineers Path

Conclusion

INTRODUCTION

- In the past, engineers would conduct periodic traffic surveys. These methods, offered a snapshot of traffic conditions. The limitations of these traditional approaches often resulted in over-engineered or under-designed pavements, leading to either unnecessary expenditure or premature failure.
- Traffic data modelling has been transformed by the advent of digital technologies and big data analytics

- Today, we can collect vast amounts of real-time data, This data, when analysed provides a detailed and dynamic picture of traffic patterns. The ability to model these patterns accurately is crucial for designing pavements that are not only durable but also cost-effective and sustainable.

HISTORY OF TRAFFIC DATA COLLECTION

Early Years (1994-2004)

- **New technologies like GPS and sensors**
- **The research in the early years highlighted the importance of understanding driver behavior and its impact on traffic flow.**

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Middle Years (2005-2014)

- Rise of intelligent transportation systems (ITS)
advanced traffic management systems.
- Focus on traffic simulation modeling
- Research explored the effects of traffic incidents, road geometry, and weather on traffic behavior.

Recent Years (2015-2024)

- The rapid growth of big data analytics, machine learning, and artificial intelligence applications
- Integration of new data sources, such as social media, and crowdsourcing.
- Research period emphasis on smart traffic management, traffic prediction, and autonomous vehicles.

Goal of Traffic Data Modelling for Pavement Design

- Durable Roads

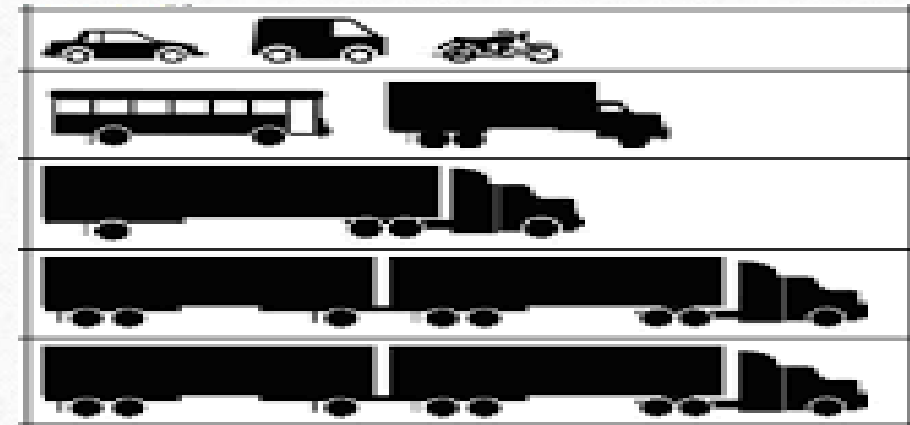


Factors to analyse to achieve the Goals

- **Traffic Volume**



Vehicle Classification



Axle Weight Distribution



Traffic Modelling Techniques and Softwares



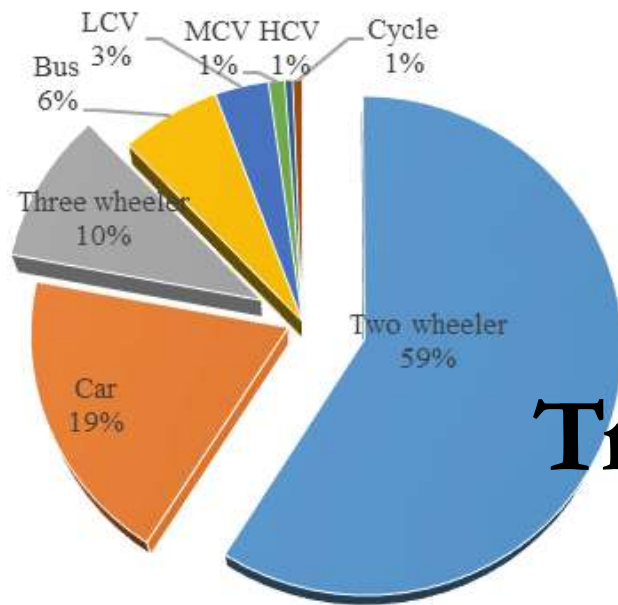
Common Pavement Design Softwares

- ***AASHTOWare***

- ***PavementMe***
- ***DARWin-Me***
- ***KenPave***
- ***Pave-X***
- ***Traffic Analyzer***

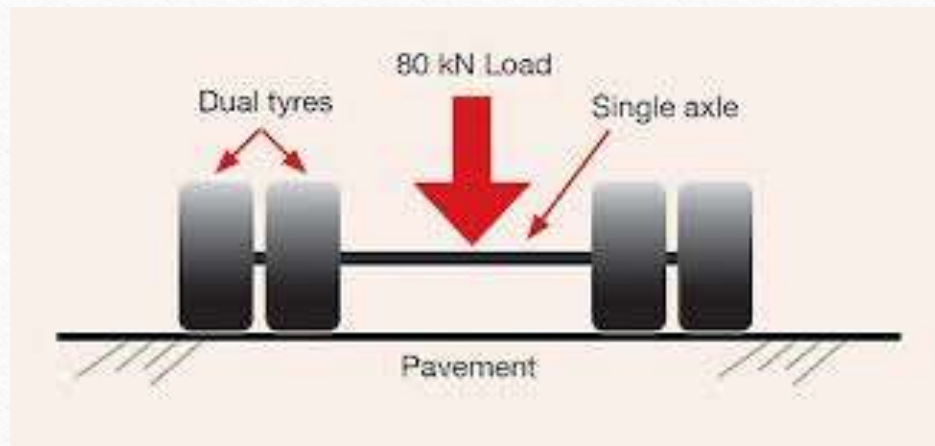
Usefulness of Traffic Data Modelling for Pavement Design

Traffic Volume



Traffic Composition

Traffic Speed



Axle Load Estimation

Traffic Growth



Pavement Performance

Vehicle Classification

Advantages of Traffic Data Modelling For Pavement Design

- **Pavement Stress**
- **Reduce Maintenance Cost**
- **Safer Driving Experience**
- **Longer Road Life Span**

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Opportunities of Traffic Data Modelling

Real-Time
Big Data Analytics



Machine
Learning

Predictive
Modelling





Data Sharing

Internet of a Thing

Challenges in Traffic Data Modelling



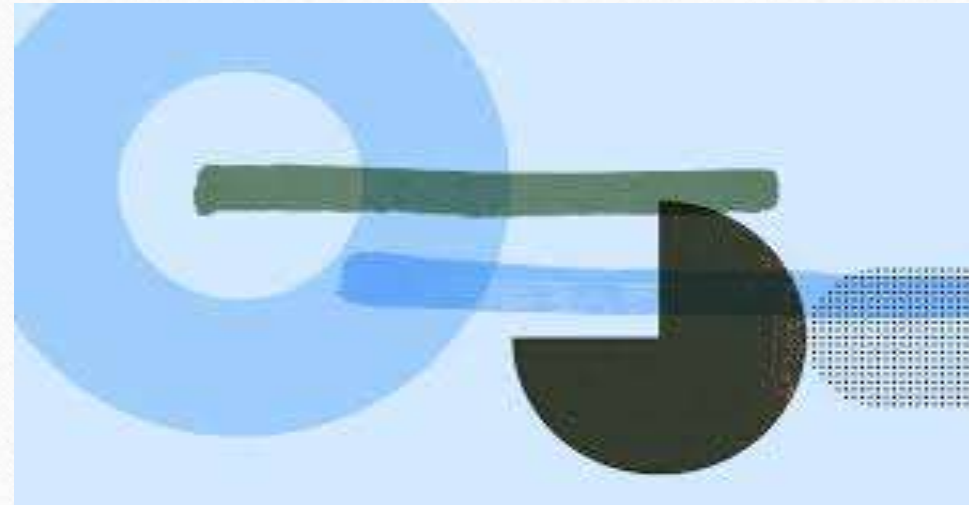
DATA ACCURACY

Data Integration and
Interoperability



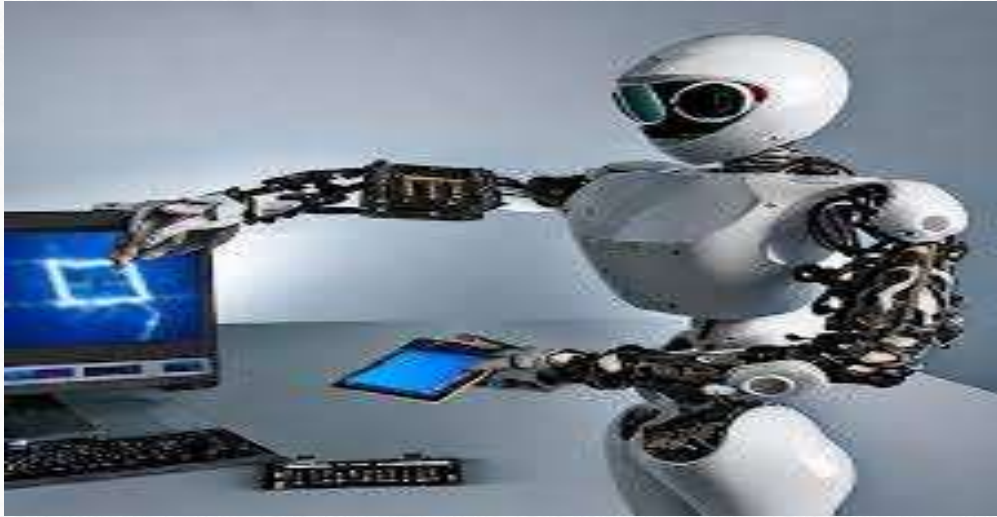
Privacy and Ethical Consideration

Cost and Resource constraints



Evolving Traffic Parten

Future Directions and Innovations



Artificial Intelligence



Connected and Autonomous Vehicles



Human-Machine Collaboration



Sustainable and Resilient Pavement Design

PATH TO SUCCESS IN TRAFFIC ENGINEERING CARRER

- **Education**
- **Gain Practical Experience**
- **Develop Key Skills**
- **Stay Up-to-Date**
- **Professional Certifications**

Conclusion

- The integration of big data, machine learning, GIS, IoT, and collaborative platforms is transforming the way we understand and design pavements.
- Ensuring data quality, integrating diverse data sources, addressing privacy concerns, and managing costs are significant hurdles that must be overcome.

➤ **collaboration between public agencies, private industry, and research institutions is essential**

➤ **Together, we can harness the power of modern technologies to create pavements that are more durable, cost-effective, sustainable and resilient**

we are in a position to change the world and not to study it. Therefore, we should put all we have learnt in the lecture into practice



Thanks for Listening

