Paper Title: Simulation-based Fuzzy Multiple Attribute Decision Making framework for an optimal apron layout for a Roll-on/Roll-off/Passenger terminal considering passenger service quality
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1 Summary

This research focuses on an agent-based simulation model for optimizing the apron layout of a Roll-on/Roll-off/Passenger (Ro-Pax) terminal to enhance passenger service quality. The simulation incorporates various entities, such as passengers, vehicles, and shuttle buses, interacting based on predefined rules. The paper evaluates the impact of different design alternatives on performance indicators and compares simulation results with actual data to assess the current layout and operation. It proposes design alternatives, introduces the Overall Alternative Rating (OAR) concept, and concludes with recommendations for improving the terminal.

1.1 Motivation

The motivation behind this research is to enhance passenger service quality at Ro-Pax terminals by optimizing apron layouts. The focus on safety, convenience, and comfort and health factors underscores the need for efficient terminal operations. The motivation is to provide valuable insights for port operators and decision-makers to make informed choices for optimal designs and layouts.

1.2 Contribution

The primary contribution of this research lies in the development and application of an agent-based simulation model for Ro-Pax terminal apron optimization. The paper contributes to the understanding of how different design alternatives impact passenger service quality. The introduction of the OAR concept offers a quantitative comparison of design alternatives, aiding decision-makers in identifying optimal improvements.

1.3 Methodology

The methodology involves the creation of an agent-based simulation model, incorporating agents representing passengers, vehicles, and shuttle buses. The model's predefined rules and statecharts replicate real-world scenarios, allowing for a comprehensive evaluation of design alternatives. The paper highlights the importance of model verification and validation, ensuring that the simulation accurately reflects operational reality.

1.4 Conclusion

The research concludes by summarizing findings, emphasizing the limitations of the current terminal apron, and providing recommendations for further research. It underscores the effectiveness of the proposed simulation framework in evaluating and optimizing passenger service quality. The conclusion aims to guide future studies, including scheduling studies for vehicles and passengers and exploring the possibility of relocating specific areas outside the terminal.

2 Limitations

2.1 First Limitation

A potential limitation is the generalizability of the proposed design alternatives to other Ro-Pax terminals. The specific characteristics of each terminal may lead to variations in the effectiveness of the proposed solutions.

2.2 Second Limitation

Another limitation could be the reliance on simulation results without real-world implementation. The study acknowledges the need for ongoing validation and adaptation based on the evolving dynamics of the Ro-Pax terminal.

3 Synthesis

In synthesis, the paper introduces a comprehensive framework for Ro-Pax terminal apron optimization, emphasizing the importance of passenger service quality. While providing valuable insights and design alternatives, the research acknowledges certain limitations. Future studies should address these limitations and further validate the proposed framework in diverse terminal settings. Overall, the research contributes to the field of terminal design and operation, offering a foundation for future improvements and innovations.