On-demand Pooling in Christchurch: Benefit or Bane?

New Zealand cities tend to be low-density, and public transportation may not be easily accessible in some areas. On-demand pooling services can offer convenient transportation solutions, either through direct door-to-door trips or as first- and last-mile connections to public transportation networks. Additionally, post-COVID travel behaviour in Australia and New Zealand demonstrates a decline in public transportation usage, particularly during peak commuting hours. The flexibility offered by on-demand transportation makes it especially suitable for addressing this behavioural shift. However, as the market for on-demand transportation expands, it is important to consider the impacts of on-demand vehicles on network performance and sustainability. This study employs Aimsun simulation software to explore the potential effects of a large-scale on-demand service operating in Christchurch. The simulation uses a mesoscopic approach to incorporate detailed traffic modelling while maintaining computational tractability. The model includes a substantial portion of Christchurch's urban road network, covering approximately 85 square kilometres and comprising around 8,350 links and 2,600 nodes. The network contains 223 signalised intersections, with approximately 40% of these located within the CBD. Signal timing is configured as fixed cycles based on SCATS controller information, ranging from 44 to 233 seconds. Bus routes, stops, and timetables are set using realistic data from Metro, Christchurch's public bus service provider. Car traffic demand is generated using 769 × 769 origin-destination pairs based on real data sourced from the Christchurch Assignment and Simulation Traffic (CAST) model maintained by the Christchurch City Council. This comprehensive network model closely mimics real-world conditions in Christchurch. The study simulates on-demand service operations during the morning peak period, investigating impacts on traffic flow, network performance, and service efficiency across different fleet sizes.