

ABSTRACT

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Title: A Stated Preference and Choice Study for Assessing People's Attitudes
Towards Autonomous And Shared Autonomous Vehicles

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Technology is rapidly transforming both vehicles and transportation systems. The nature of this transformation will depend on how fast the technology resulting from three related revolutions, those in automated, electric, and shared vehicles, will diffuse. At the same time, the 'sharing' economy is growing and affecting mobility in urban areas that includes additional travel alternatives, such as car-sharing services, ride-hailing services, bike-sharing services, and other micro-transit services. It is evident that to prepare for these large-scale operations involving autonomous vehicles (AVs), researchers and transportation professionals need the useful insights on people's attitudes toward and on acceptance of AVs that can be gained through behavioral experiments. In addition to this, it is also important to understand how the deployment of AVs will impact vehicle ownership and mode choice decisions.

The goal of this dissertation is to assess the market acceptance of AVs and shared autonomous vehicles (SAVs) via a behavioral experiment (stated preference survey) and offer insights on the potential implications of AVs and SAVs on mode choices. The following four overarching research objectives were formulated: (a) identifying the factors influencing the behavioral intention to ride in AVs; (b) identifying the characteristics of the AV market segments; (c) evaluating the attributes impacting personal vehicle ownership decisions (i.e., decisions to postpone the purchase of a non-AV due to the emergence of AVs); and (d) assessing the factors affecting mode choice decisions after the emergence of autonomous ride-sharing services operated through AVs, and evaluating the corresponding value of travel time savings. The results of each part of the research framework are integrated in the last chapter of the dissertation in order to provide the final conclusions and recommendations of the study.

To achieve these research objectives, a survey of the general population was distributed online in a major urban area with an advanced multimodal transportation system and captive users of ride-sharing users (Chicago, Illinois) and in an urban area with a more automobile-oriented

culture (Indianapolis, Indiana). The survey sample included 400 responses of adults, representative of age and gender on each area.

One of the contributions of this dissertation is a theoretical model to assess the behavioral intention to ride in AVs that includes components of the theory of Planned Behavior, the theory of Diffusion of Innovation and additional factors derived from the literature while evaluating possible interrelationships between these components. A more holistic approach along these lines can help explain whether the emerging AV technology can diffuse by identifying the factors and key determinants that influence the behavioral intention to ride in AVs. The market segmentation analysis can further provide knowledge of the socio-demographic characteristics of potential AV users and an accurate classification of these groups of potential users in terms of their willingness to ride in AVs. The findings can provide insights into perceptions of and attitudes toward AVs that can help transportation and urban planners, as well as original equipment manufacturers, to prepare for the deployment of AVs by designing marketing strategies to improve people's perceptions of AVs and increase market penetration.

Moreover, this dissertation provides a well-documented and easy-to-use framework that can support both planning and policy decisions in urban areas in an era of emergent automated transportation technologies. In urban areas with advanced multimodal transportation networks, the framework can be applied to identify the impact of particular attributes on shared mobility in urban settings. In urban areas with a more car-oriented culture, the framework can be applied to explore the potential impacts of the emergence of AVs on personal vehicle ownership patterns. Finally, the survey that was designed to fulfill the goal of this dissertation can be replicated and distributed in metropolitan areas outside the US with more advanced multimodal transportation systems or areas within the US with traditionally higher rates of affinity to innovativeness and areas where AVs have been pilot-tested in real-world road conditions.