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# Driving towards the future: Investigating senior tourist acceptance factors of autonomous vehicles in travel and tourism

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## *ABSTRACT*

This paper investigates the role of autonomous vehicles in transforming mobility and tourism. By extending the understanding of self-driving cars within a tourism context, this paper enhances the Automation Acceptance Model and tests the effects of underexplored variables in tourism studies, such as social influence, prior knowledge, and openness to change as a moderator. Data were collected through a survey method, and responses from 269 participants were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). These results suggest that while the extension of the theoretical model is informative, the insignificance of six of the proposed hypotheses calls for deeper investigation in other contexts concerning user acceptance behaviors. This opens new directions for further research, particularly with regard to age, perceived safety, and the level of trust in the technology. The paper concludes with practical implications to help increase the acceptance of autonomous vehicles among senior tourists, discusses limitations, and provides recommendations for future investigation in this rapidly evolving area.

**Contribution/Originality:** Existing studies largely overlook the acceptance of autonomous vehicles (AVs) among senior tourists. This research aims to fill this knowledge gap by investigating the unique factors influencing AV acceptance in this demographic. This underrepresented group provides valuable insights that can shape future developments in both AV technology and tourism practices.

## 1. INTRODUCTION

The incorporation of artificial intelligence (AI) and real-time data processing technologies is crucial for achieving significant levels of vehicle automation (Panagiotopoulos & Dimitrakopoulos, 2018). Autonomous vehicles (AVs), powered by AI, represent a major advancement in the transportation sector, as demonstrated by studies conducted by Hengstler, Enkel, and Duelli (2016) and Liu, Yang, and Xu (2019). Fully or highly automated can operate with minimal human interference (Sea, 2014). Autonomous driving primarily relies on the decision-making expertise of AI, enabling it to perform all tasks associated with driving without human oversight or involvement. However, the use of autonomous vehicles has raised concerns about safety, legal liability, and personal data privacy (Hafeez et al., 2022; Soteropoulos, Berger, & Ciari, 2019). The wide range of benefits AVs promise, such as improved road safety and reduced traffic congestion by minimizing human errors, have led to their widespread acceptance (Choi & Ji, 2015). Bansal, Kockelman, and Singh (2016) and König and Neumayr (2017) support the findings that AV can significantly improve the mobility of elderly and disabled individuals. While social science research into the acceptance of AVs has grown rapidly, there remains a significant knowledge gap regarding the willingness of senior tourists to adopt this technology, particularly in the context of travel and tourism. The purpose of this research is to identify the factors that influence the adoption of AVs by senior tourists—an increasingly important target market due to their financial resources, abundant leisure time, and growing participation in tourism activities (Han, Hwang, & Kim, 2015; Liew, Hussin, & Abdullah, 2021). Given the limited studies on senior travelers in the current literature and the role of age in the adoption of contemporary technologies (Ramos-Soler, Martínez-Sala, & Campillo-Alhama, 2019), this research is both timely and necessary. The literature has not yet reported any empirical evidence regarding the adoption of AVs among senior tourists being a recent but rapidly growing global phenomenon. This is further supported by the potential for AVs to revolutionize tourism services, such as guided tours and sightseeing (S. Cohen, Stienmetz, Hanna, Humbracht, & Hopkins, 2020; He & Csiszár, 2020).

In summary, the adoption of autonomous vehicles (AVs) primarily relies on adapting and extending conventional models such as the Technology Diffusion Theory (TDT), the Technology Acceptance Model (TAM), and the Unified Theory of Acceptance and Use of Technology (UTAUT), with particular consideration of consumer traits and characteristics, as well as sociological and demographic factors (Leicht, Chtourou, & Youssef, 2018; Syahrivar et al., 2021; Zhang et al., 2019) as well as sociological and demographic factors (Acheampong & Cugurullo, 2019). However, this research is distinct because, for the first time, it applies the Automation Acceptance Model (AAM) to explore the acceptance of AVs by senior tourists—a context that has received relatively little attention in previous studies. This unique application of the Automation Acceptance Model (AAM) allows for a focused examination of both external and internal factors that are crucial in understanding the distinctive characteristics of senior tourists as potential AV users. Based on the AAM, this study evaluates these factors affecting senior tourists' acceptance of autonomous vehicles (Ghazizadeh, Lee, & Boyle, 2012). To the best of our knowledge, no previous research has applied the AAM to senior tourists' acceptance of AVs, making this study a significant contribution to the existing body of knowledge. In addition to highlighting the managerial implications of AVs in the automotive industry, this study emphasizes the strategic targeting of senior tourists as potential customers. This leads to the central research question:

RQ: What are the key internal and external factors influencing senior tourists' acceptance of autonomous vehicles in travel and tourism?

The remainder of this paper is organized as follows: Section 2 reviews the relevant literature on autonomous vehicles, focusing on their application in tourism and the factors influencing senior tourists' acceptance. Section 3 delineates the data collection and analysis methodology, highlighting the Automation Acceptance Model (AAM) as the theoretical framework. Section 4 presents the results of the empirical analysis, identifying the key factors affecting senior tourists' acceptance of AVs. Section 5 discusses the theoretical and managerial implications of the findings, particularly in relation to the strategic targeting of senior tourists as potential customers. Section 6 concludes the paper by summarizing the key findings and proposing directions for future research.

## 2. HYPOTHESES AND RESEARCH MODEL

### *2.1. Usefulness (PU)*

The Automation Acceptance Model (AAM) follows the Technology Acceptance Model (TAM) to understand automation technology within the context of information systems, with a greater focus on perceived usefulness (PU) and perceived ease of use (PEOU). PU has been widely studied for its direct and indirect effects on the intention to use technology (Huarng, Yu, & fang Lee, 2022; To & Trinh, 2021). It has been shown to significantly influence the adoption of chatbots (Chocarro, Cortiñas, & Marcos-Matás, 2023), wearable devices (Huarng et al., 2022), online shopping (Yang, Xu, & Xing, 2022), and social media use (Hyun, Thavisay, & Lee, 2022). A person is more likely to use a system if they perceive that its use will enhance their performance (Verma, Bhattacharyya, & Kumar, 2018). As noted by Zhang, Khan, Cao, and Khan (2023), perceived usefulness (PU) significantly influences the adoption of systems. In the case of autonomous vehicles, several studies have identified PU as a key factor in users' acceptance of the technology. When users perceive that autonomous vehicles offer more benefits compared to traditional modes of transportation, they are more likely to adopt them. Based on the findings of (Panagiotopoulos & Dimitrakopoulos, 2018; Zhang et al., 2020), we develop the following hypotheses:

*$H_1$: PU positively influences senior tourists' intention to accept AVs.*

### *2.2. Ease of use*

Perceived Ease of Use (PEOU) refers to an individual's confidence in using a specific technology without requiring much effort (Davis, Bagozzi, & Warshaw, 1989). People perceive technology as more valuable when it is easy to use and allows them to maximize its benefits (Foon, Ganesan, Iranmanesh, & Foroughi, 2020). Additionally, the belief that a new system requires minimal effort contributes to positive intentions to use it (Iranmanesh, Ghobakhloo, Foroughi, Nilashi, & Yadegaridehkordi, 2023). Several studies have demonstrated that PEOU significantly influences the intention to accept technology; however, specific investigations into the acceptance of AVs have shown no significant effects from perceived ease of use. Therefore, factors such as trust have a more substantial influence on acceptance intentions than PEOU (Park, Hong, & Le, 2021), and the indirect effects of PEOU through perceived usefulness (PU) are more significant than PEOU itself (Panagiotopoulos & Dimitrakopoulos, 2018). Nevertheless, the user-friendly nature of AVs should be further explored. For senior tourists, accepting autonomous vehicles represents a novel experience that may pose certain challenges (Park et al., 2021). Therefore, we propose the following hypotheses:

*$H_2$: PEOU positively influences senior tourists' intention to accept AVs.*

*$H_3$: PEOU positively influences PU.*

### *2.3. Trust*

The Automation Acceptance Model (AAM) includes a construct for trust (TR) to understand automation technology from a cognitive engineering perspective. Trust is a crucial factor in technology acceptance, as users are more likely to adopt technologies they perceive as trustworthy (Choi & Ji, 2015). The AAM framework, therefore, posits that trust will directly influence acceptance intentions. In fact, various studies have confirmed that trust is one of the significant determinants of AV acceptance (Buckley, Kaye, & Pradhan, 2018). Furthermore, the AAM suggests that trust indirectly links perceived usefulness and perceived ease of use to acceptance intentions. For example, previous research has shown that the effect of trust on AV acceptance can be indirect (Choi & Ji, 2015). Based on these studies, we propose the following hypotheses:

*$H_4$: TR significantly influences senior tourists' intention to accept AVs.*

*$H_5$: TR significantly influences senior tourists' PU perceptions of AVs.*

*$H_6$: TR positively influences senior tourists' PEOU perceptions of AVs.*

### *2.4. Compatibility (COM)*

In addition to trust, compatibility should also be considered a crucial determinant in the acceptance of AVs. According to Rogers (2003), compatibility is "the degree to which an innovation is perceived as being consistent with the potential adopter's existing needs, values, and past experiences." The term describes the degree to which users integrate AVs into their established patterns, routines, demands, and behaviors. Scholars such as Nastjuk, Herrenkind, Marrone, Brendel, and Kolbe (2020) and Yuen, Chua, Wang, Ma, and Li (2020) identify compatibility as a key factor influencing perceived usefulness and the intention to accept AVs. Furthermore, compatibility determines the extent to which people perceive autonomous technology as both usable and trustworthy (Ghazizadeh et al., 2012; Karahanna, Agarwal, & Angst, 2006). Therefore, we propose the following hypothesis:

*$H_7$: COM positively influences the intention of senior tourists to accept AV.*

*$H_8$: COM significantly influences senior tourists' usefulness intentions for AV.*

*$H_9$: COM significantly influences senior tourists' ease-of-use intention toward AV.*

*$H_{10}$: COM significantly influences senior tourists' trust intentions toward AV.*

The Automation Acceptance Model (AAM) explains the adoption of automation technology based on factors such as user characteristics, task characteristics, and organizational factors. Consequently, the model's design incorporates the unique interactions between senior tourists and autonomous vehicles. To assess senior tourists' behavior towards autonomous driving, social influence and prior experiences were assigned as external variables, with openness to change as a moderating factor. According to the AAM framework, trust, compatibility, perceived usefulness (PU), and perceived ease of use (PEOU) indirectly influence acceptance intention.

### *2.5. Social Influence*

Social influence (SI) refers to an individual's perception of whether important people in their life believe they should or should not engage in a particular behavior (Fishbein & Ajzen, 1977). Several studies have demonstrated that social influence significantly impacts the acceptance of autonomous vehicles (AVs). This underscores the significance of taking into account others' viewpoints during decision-making, particularly given that cars frequently serves as symbols of advancement (Panagiotopoulos & Dimitrakopoulos, 2018). It also has an indirect effect on factors such as Trust (TR), Communication (COM), Perceived Usefulness (PU), and Perceived Ease of Use (PEOU) (Nastjuk et al., 2020; Zhang et al., 2020; Zhu, Chen, & Zheng, 2020). In this study, the framework of the Automation Acceptance Model was employed to examine how social influence may indirectly impact the acceptance of autonomous vehicles. Based on this understanding, we propose the following hypothesis:

*$H_{11\text{-}14}$: Social influence positively influences senior tourist's trust (H11), compatibility (H12), PU (H13), and PEOU (H14) perceptions of AVs.*

### *2.6. Prior-Knowledge (PK)*

This study investigated the immediate and long-term effects of prior knowledge (PK) on the acceptance of AVs. Individuals with firsthand experience in a particular area generally possess a deeper understanding of that field, which often leads to more positive attitudes and behaviors toward it. Prior knowledge (PK) significantly influences the acceptance of emerging technologies. Travelers over the age of 50 are more likely to adopt new technology if they have direct experience with it and are familiar with its features (Cham et al., 2023). In the case of autonomous vehicles, prior knowledge significantly impacts their influence and acceptance. For instance, individuals with previous knowledge of autonomous vehicles tend to express fewer concerns and hold more positive views of them (Charness, Yoon, Souders, Stothart, & Yehnert, 2018). Based on this, we propose the following hypothesis:

*$H_{15\text{-}18}$: Prior knowledge significantly influences senior tourist trust (H15), compatibility (H16), PU (H17), and PEOU (H18) perceptions of AVs.*

### *2.7. Openness to Change as Moderator*

Openness to Change (OC) refers to an individual's intellectual and emotional engagement in unstable and uncertain conditions (Schwartz, 1992). Essentially, it involves maintaining an open and creative mindset by accepting risks and exploring new ideas (Kruse, Rakha, & Calderone, 2018). This concept encompasses stimulation, hedonism, and self-direction, which facilitate adaptation and survival in changing environments (Schwartz, 2003). Individuals who value openness to change (OC) tend to find joy in being early adopters of innovative solutions (Schuitema, Anable, Skippon, & Kinnear, 2013). Steg, Bolderdijk, Keizer, and Perlaviciute (2014) found that individuals who prioritize hedonism often experience a sense of novelty when embracing new phenomena. Consumers' willingness to engage in OC has been identified as a key factor influencing purchase intentions (Tewari, Mathur, Srivastava, & Gangwar, 2022). Additionally, OC has been considered a moderating factor in various studies. For instance, Barbarossa, De Pelsmacker, and Moons (2017) identified OC as a moderating factor in the adoption of electric cars. A recent study by (Ahmad, Kim, Choi, & Haq, 2021) found that OC moderates the relationship between UTAUT factors and the intention to use reservation apps among American and Chinese travelers. Several studies, such as those by Kushwah, Dhir, and Sagar (2019a) and Kushwah, Dhir, and Sagar (2019b), have demonstrated the moderating influence of values on behavior. Based on these findings, we propose the following hypothesis:

*$H_{19-20}$: OC positively moderates the association between (19) PU and adoption intention toward AV (20) PEOU and adoption intention toward AV.*

Figure 1 presents the key components of the Automation Acceptance Model (AAM) relevant to senior tourists' acceptance of autonomous vehicles as a mode of transportation. The diagram illustrates the connections between senior tourists' acceptance of autonomous vehicles for travel and the various influencing factors. It provides a clear overview of how travel and tourism contexts influence the dynamics of acceptance.

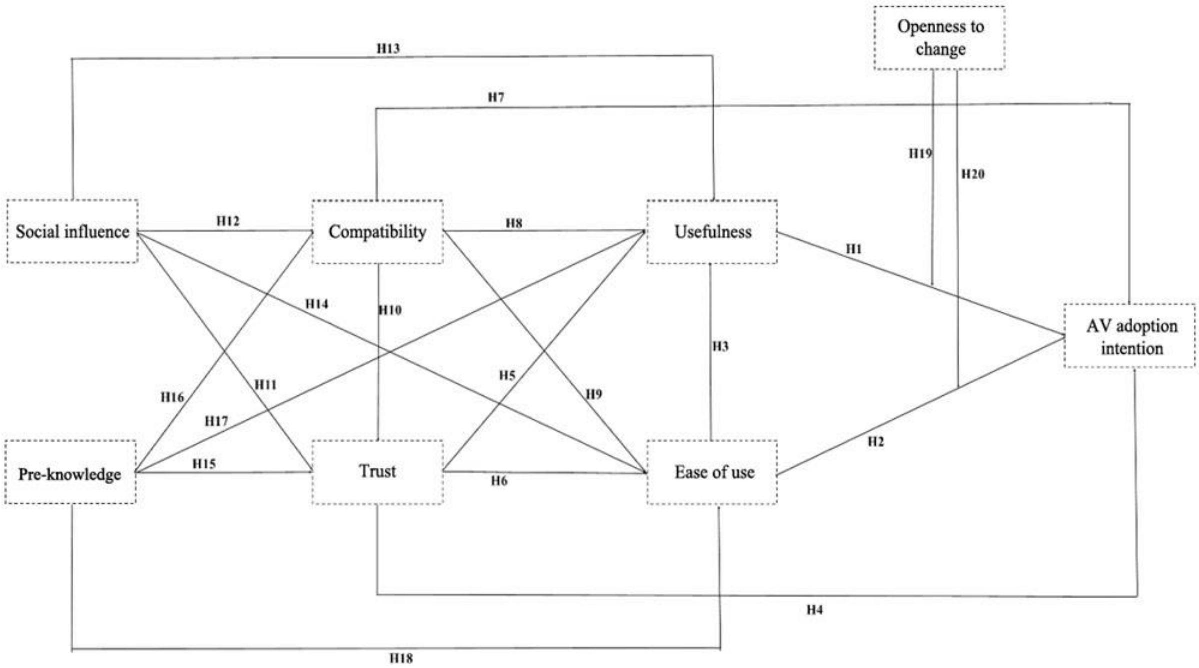


**Figure 1.** Proposed research model.

## 3. DATA AND METHODOLOGY

### *3.1. Participant*

This study primarily focused on senior Chinese tourists in their 50s and 60s who drive as part of their daily routine. In their 50's individuals increasingly depend on driving assistance for two primary reasons. First, physical and cognitive abilities tend to decline after age 50, as noted by Wolinsky et al. (2010). Additionally, the increase in traffic accidents among individuals in their 50s and 60s makes driving a greater challenge, as observed in 2010. This rise in accidents highlights the need for additional support to ensure safer driving for this demographic. To gather data, a face-to-face survey was conducted with 450 senior tourists using self-administered questionnaires. The study was limited to individuals who met the specific criteria for inclusion. Purposive sampling was employed along with screening criteria to ensure reliable and accurate responses. After completing data cleaning procedures—including checks for normality, detection of missing data, outlier assessment, and evaluation of multicollinearity—269 cases were retained. Table 1 presents an overview of the participants' characteristics.

**Table 1.** Demographic characteristics.

| Characteristics | | Frequency | Percent |
|---|---|---|---|
| Gender | Male | 197 | 73.2 |
| | Female | 72 | 26.8 |
| Age | 51-55 | 74 | 27.5 |
| | 56-60 | 63 | 23.6 |
| | 61-65 | 102 | 38.1 |
| | 71 or above | 29 | 10.8 |
| Education status | Primary school | 8 | 2.9 |
| | High school | 41 | 15.4 |
| | Bachelor degree | 149 | 55.4 |
| | Master's degree or higher | 71 | 26.3 |
| Income status | 4000 or less | 37 | 13.7 |
| | 4001-7000 | 95 | 35.5 |
| | 7001-10000 | 87 | 32.4 |
| | more than 10000 | 49 | 18.4 |
| Year of driving experience | < 5 years | 4 | 1.4 |
| | > 5 years and < 10 years | 13 | 5 |
| | > 10 years and < 20 years | 46 | 17.2 |
| | > 20 years | 206 | 76.4 |

### *3.2. Measure*

Senior tourists were given an overview of AVs before completing the survey. In this study, we introduced the concept of Level 3 autonomous vehicles, which are characterized by a limited degree of automated driving. To assess perceptions and acceptance intentions of Level 3 AVs, we examined respondents' views across four constructs and two external variables. First, trust in autonomous vehicles is defined as the belief that these vehicles are safe (Choi & Ji, 2015). Furthermore, compatibility (COM) assesses the extent to which respondents' values, driving experiences, and daily routines are compatible with AV adoption (Nastjuk et al., 2020). Perceived Usefulness (PU) and perceived ease of use (PEOU) are measures of participants' perceptions that autonomous vehicles offer more benefits and are easier to operate than conventional vehicles (Park et al., 2021). In the context of external variables, the survey participants defined a social influence (SI) measure as their level of perception of others' opinions regarding autonomous vehicles (Panagiotopoulos & Dimitrakopoulos, 2018). (Charness et al., 2018) evaluated respondents familiarity and acquaintance with technology to assess their pre-knowledge (PK) of autonomous vehicles. Finally, openness to change (OC) is a guiding principle that motivates people to take intellectual and emotional risks (Schwartz, 1992). The final questionnaire is presented in Appendix 1.

### *3.3. Data Analysis*

The hypotheses were tested using Partial Least Squares Structural Equation Modeling (PLS-SEM), which is considered effective for testing composite models (Hair, Hult, Ringle, & Sarstedt, 2016). Exploratory research, which uses results to develop theory or unravel complex relationships, significantly benefits from the use of PLS-SEM. It was, therefore, an ideal choice for this study, given the relatively limited research on senior tourists' acceptance of AVs. This method is also widely applied in various studies by Hair et al. (2016), including tourism research, as demonstrated by Selmi, Bahri-Ammari, Soliman, and Hanafi (2021). The use of PLS-SEM in this study further distinguishes it from other AV acceptance research that mostly employs covariance-based SEM methods. This adds robustness to the findings and provides a new perspective on understanding AV acceptance among senior tourists (CB-SEM). By using PLS-SEM, this research not only leverages the technique's flexibility in handling complex models with multiple variables but also addresses the specific needs of analyzing the unique demographic of senior tourists. The study was based on the guidelines of Fornell and Larcker (1981b) for assessing scale validity and reliability. Smart-PLS 3 software was employed in this research, allowing for a detailed examination of both internal and external factors, as outlined in the Automation Acceptance Model. This provided deeper insights into the factors influencing senior tourists' acceptance of AVs.

## 4. FINDINGS

### *4.1. Common Method Bias (CMB)*

Common method bias (CMB) could have affected the study's validity, even though it used a self-reporting technique for the questionnaires. To address this, the Harman single-factor test, as described by Podsakoff, MacKenzie, Lee, and Podsakoff (2003), was applied. According to this test, CMB may be present if a single factor accounts for more than 50% of the variance. In this study, Factors 1 and 2 together explained a total of 67.77% of the variance across five factor-concentrated relationships, with neither Factor 1 nor Factor 2 dominating, as both had factor loadings of less than 50%. Based on these findings, we concluded that the data set was free from common method bias.

### *4.2. Measurement Model*

To test the validity of the model, a confirmatory factor analysis (CFA) was conducted using the proposed model. According to Hair, Black, Babin, Anderson, and Tatham (1998), there are three approaches to evaluating the model: composite reliability, average variance extracted (AVE), and Cronbach's alpha. The PLS algorithm was used to estimate the outer loadings of each construct. As shown in Table 2, composite reliability was achieved, with Cronbach's alpha values well above the 0.7 threshold, and the AVE values also met the 0.5 threshold. According to the CFA, each item's loading factor was significantly higher than 0.7. Table 2 presents the results of the CFA, showing values for composite reliability (CR), Cronbach's alpha (CA), and AVE above 0.7, 0.7, and 0.5, respectively, indicating strong convergent validity, consistent with the recommendations of (Fornell & Larcker, 1981a; Hair et al., 1998; Nunnally & Bernstein, 1978). Additionally, the rho indices were above 0.7, further confirming internal consistency (Dijkstra & Henseler, 2015).

**Table 2.** Construct Validity.

| Constructs | Items | Factor loading | a | rho_A | CR | AVE |
|---|---|---|---|---|---|---|
| Pre-knowledge | PK1 | 0.78 | 0.779 | 0.781 | 0.872 | 0.695 |
| | PK2 | 0.856 | | | | |
| | PK2 | 0.862 | | | | |
| Trust | TR1 | 0.828 | 0.714 | 0.724 | 0.84 | 0.638 |
| | TR2 | 0.837 | | | | |
| | TR3 | 0.726 | | | | |
| Ease of use | PEOU1 | 0.727 | 0.718 | 0.742 | 0.811 | 0.517 |
| | PEOU2 | 0.721 | | | | |
| | PEOU3 | 0.71 | | | | |
| | PEOU | 0.719 | | | | |
| Acceptance intention | AVAI1 | 0.772 | 0.729 | 0.751 | 0.798 | 0.57 |
| | AVAI2 | 0.683 | | | | |
| | AVAI3 | 0.805 | | | | |
| Compatibility | COM 1 | 0.713 | 0.704 | 0.704 | 0.818 | 0.529 |
| | COM 2 | 0.751 | | | | |
| | COM 3 | 0.719 | | | | |
| Social influence | SI1 | 0.884 | 0.868 | 0.871 | 0.919 | 0.791 |
| | SI2 | 0.885 | | | | |
| | SI3 | 0.898 | | | | |
| Usefulness | PU1 | 0.829 | 0.766 | 0.766 | 0.865 | 0.681 |
| | PU2 | 0.839 | | | | |
| | PU3 | 0.808 | | | | |

Discriminant validity assesses how well the observed measurements of individual constructs correspond to their respective constructs (Hair Jr, Sarstedt, Ringle, & Gudergan, 2017). The Fornell-Larcker criterion is a commonly used method to assess the discriminant validity of measurement models. This criterion specifies that the correlation of a construct with other constructs should be less than the square root of its AVE (Fornell & Larcker, 1981b). Additionally, discriminant validity was assessed using the Heterotrait-Monotrait (HTMT) ratio. A ratio less than 0.90 confirmed the discriminant validity between two reflective constructs (Rasouli, Rasoolimanesh, Rahmani, Momayez, & Torabi, 2022). As shown in Table 3, the indicators for each construct demonstrate the highest correlation coefficients with their respective constructs and the lowest with other constructs, thus supporting the strong discriminant validity of the research model, as depicted in Figure 2.

**Table 3.** Discriminant validity.

| | **AVAI** | **COM** | **PEOU** | **PK** | **SI** | **TR** | **PU** |
|---|---|---|---|---|---|---|---|
| AVAI | 0.755 | | | | | | |
| COM | 0.593 | 0.727 | | | | | |
| PEOU | 0.491 | 0.566 | 0.719 | | | | |
| PK | 0.522 | 0.574 | 0.397 | 0.834 | | | |
| SI | 0.546 | 0.604 | 0.492 | 0.585 | 0.889 | | |
| TR | 0.435 | 0.581 | 0.319 | 0.511 | 0.463 | 0.799 | |
| PU | 0.462 | 0.723 | 0.636 | 0.543 | 0.457 | 0.465 | 0.825 |
| Heterotrait–monotrait ratio (HTMT) | | | | | | | |
| | AVAI | COM | PEOU | PK | SI | TR | PU |
| AVAI | | | | | | | |
| COM | 0.871 | | | | | | |
| PEOU | 0.695 | 0.686 | | | | | |
| PK | 0.734 | 0.776 | 0.466 | | | | |
| SI | 0.726 | 0.773 | 0.594 | 0.715 | | | |
| TR | 0.623 | 0.814 | 0.338 | 0.688 | 0.583 | | |
| PU | 0.639 | 0.869 | 0.733 | 0.704 | 0.559 | 0.624 | |

### *4.3. Structural Model Results*

Bootstrapping is the optimal method for testing the mediating effect, as it provides favorable statistical results (Preacher & Hayes, 2008). To assess the direct effects, the bootstrapping method in Smart PLS was applied with 5000 subsamples. Acceptance intention was significantly affected by usefulness ($\beta = 0.174$, $p < 0.05$), technology readiness (TR) ($\beta = 0.176$, $p < 0.05$), and compatibility (COM) ($\beta = 0.302$, $p < 0.05$), supporting H1, H4, and H7. In contrast, H2 was unsupported, as perceived ease of use (PEOU) did not significantly influence acceptance intention ($\beta = 0.071$, $p > 0.05$). Usefulness was significantly affected by PEOU ($\beta = 0.248$, $p < 0.05$), trust ($\beta = 0.273$, $p < 0.05$), compatibility ($\beta = 0.260$, $p < 0.05$), and social influence (SI) ($\beta = 0.141$, $p < 0.05$), supporting H3, H5, H8, and H13. However, prior knowledge ($\beta = 0.051$, $p > 0.05$) did not significantly influence usefulness, so H17 was not supported. Additionally, prior knowledge ($\beta = 0.345$, $p < 0.05$) significantly influenced PEOU, thus supporting H18. In contrast, H6, H9, and H14 were not supported, as PEOU was not significantly influenced by trust ($\beta = 0.160$, $p > 0.05$), compatibility ($\beta = 0.089$, $p > 0.05$), or social influence ($\beta = 0.116$, $p > 0.05$). Trust was significantly influenced by compatibility ($\beta = 0.345$, $p < 0.05$), social influence ($\beta = 0.172$, $p < 0.05$), and prior knowledge ($\beta = 0.261$, $p < 0.05$), supporting H10, H11, and H15.

Lastly, social influence ($\beta = 0.278$, $p < 0.05$) significantly influenced compatibility, supporting H12, while compatibility ($\beta = 0.016$, $p > 0.05$) was not significantly influenced by prior knowledge, meaning H16 was not supported (Table 4).

**Table 4.** Structural equation modeling (SEM).

| Hypothesis and path | Beta | SD | T values | P Values | Confidence interval | | Remarks |
|---|---|---|---|---|---|---|---|
| H1: PU → AVAI | 0.174 | 0.058 | 2.984 | 0.003 | 0.063 | 0.298 | √ |
| H2: PEOU → AVAI | 0.071 | 0.053 | 1.335 | 0.183 | -0.026 | 0.174 | × |
| H3: PEOU → PU | 0.248 | 0.099 | 2.502 | 0.013 | 0.050 | 0.424 | √ |
| H4: TR → AVAI | 0.176 | 0.062 | 2.857 | 0.004 | 0.054 | 0.297 | √ |
| H5: TR → PU | 0.273 | 0.067 | 4.049 | 0.000 | 0.140 | 0.406 | √ |
| H6: TR → PEOU | 0.160 | 0.085 | 1.890 | 0.059 | -0.026 | 0.310 | × |
| H7: COM → AVAI | 0.302 | 0.062 | 4.902 | 0.000 | 0.187 | 0.419 | √ |
| H8: COM → PU | 0.260 | 0.075 | 3.445 | 0.001 | 0.121 | 0.410 | √ |
| H9: COM → PEOU | 0.089 | 0.137 | 0.649 | 0.516 | -0.177 | 0.355 | × |
| H10: COM → TR | 0.345 | 0.057 | 6.013 | 0.000 | 0.229 | 0.449 | √ |
| H11: SI → TR | 0.172 | 0.054 | 3.193 | 0.001 | 0.069 | 0.277 | √ |
| H12: SI → COM | 0.278 | 0.080 | 3.468 | 0.001 | 0.131 | 0.439 | √ |
| H13: SI → PU | 0.141 | 0.070 | 2.021 | 0.044 | 0.013 | 0.289 | √ |
| H14: SI → PEOU | 0.116 | 0.089 | 1.308 | 0.192 | -0.093 | 0.269 | × |
| H15: PK → TR | 0.261 | 0.059 | 4.425 | 0.000 | 0.138 | 0.366 | √ |
| H16: PK → COM | 0.016 | 0.083 | 0.190 | 0.849 | 0.214 | 0.471 | × |
| H17: PK → PU | 0.051 | 0.058 | 0.881 | 0.378 | -0.057 | 0.165 | × |
| H18: PK → PEOU | 0.345 | 0.070 | 4.955 | 0.000 | -0.143 | 0.180 | √ |

### *4.4. The Effect Size and Predictive Relevance*

For the predictive validity check of a large and complex model using the blindfolding method, the $Q^2$ value is assessed; when $Q^2$ is above 0, it indicates that the model has predictive power (Cohen, 1988). Following Chin (1998) with a moderate effect size, all $f^2$ values for the respective relationships were well above the recommended range, as shown in Table 5. The adjusted $R^2$ values for trust, ease of use, acceptance intention, compatibility, and usefulness were 0.389, 0.359, 0.402, 0.439, and 0.624, respectively (Table 5).

**Table 5.** Results of $Q^2$ and $f^2$.

| Endogenous variables | R square | $Q^2$ | Exogenous variables | $f^2$ |
|---|---|---|---|---|
| TR | 0.389 | 0.220 | COM | 0.142 |
| | | | PK | 0.052 |
| | | | SI | 0.007 |
| PEOU | 0.359 | 0.148 | COM | 0.148 |
| | | | PK | 0.001 |
| | | | SI | 0.046 |
| | | | TR | 0.004 |
| AVAI | 0.402 | 0.202 | COM | 0.110 |
| | | | PEOU | 0.061 |
| | | | TR | 0.023 |
| | | | PU | 0.003 |
| COM | 0.439 | 0.209 | PK | 0.133 |
| | | | SI | 0.194 |
| PU | 0.624 | 0.380 | COM | 0.253 |
| | | | PEOU | 0.201 |
| | | | PK | 0.051 |
| | | | SI | 0.022 |
| | | | TR | 0.003 |

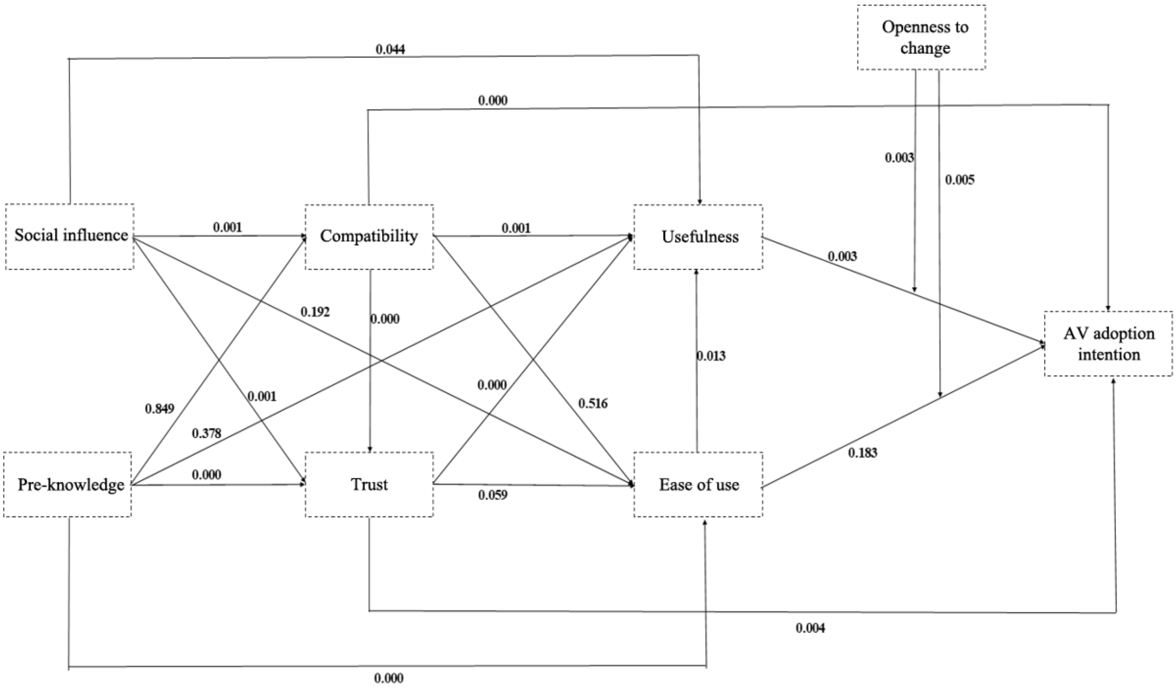


**Figure 2.** Model with result.

### *4.5. Moderation Analysis*

Using the median split procedure, the sample was divided into two subgroups based on the level of OC moderation: high OC (N = 142) and low OC (N = 127). This approach has been adopted in recent studies (e.g., (Kang & Moreno, 2020; Kautish, Paul, & Sharma, 2019). The results of the moderation analysis of OC are presented in Table 6. First, the results show that the p-value of the interaction (OC × PU) is 0.003, which is less than 0.05, and the confidence interval does not include zero, indicating that OC (β OC × PU → AVAI = 0.094, $p < 0.05$) has a moderating effect on the association between PU and AVAI. It was clear that moderation effect was important in the higher-level group (β PEOU → AVAI = 0.663, $p < 0.05$) from the conditional effects of the moderator values in Table 6 (Hayes & Rockwood, 2017). Next, the p-value of the interaction (PEOU × OC) was 0.005, which is less than 0.05, and the confidence interval did not include zero, indicating that OC (β OC × PEOU → AVAI = 0.076, $p < 0.05$) has a moderating effect on the association between PEOU and AVAI. These results show that the moderation effect is important in both the low-level (β PEOU → AVAI = 0.250, $p < 0.05$) and higher-level (β PU → AVAI = 0.695, $p < 0.05$) groups (Hayes & Rockwood, 2017).

**Table 6.** Moderation analysis.

| Moderation analysis | | | | Low OC | | | High OC | | |
|---|---|---|---|---|---|---|---|---|---|
| **Path** | **Beta** | **P** | **Moderation** | **Path** | **Beta** | **p** | **Path** | **Beta** | **p** |
| AVAI ← OC*PU | 0.094 | 0.003 | Yes | AVAI ← PEOU | 0.024 | 0.598 | AVAI ← PEOU | 0.250 | 0.000 |
| AVAI ← PEOU*OC | 0.076 | 0.005 | Yes | AVAI ← PU | 0.663 | 0.000 | AVAI ← PU | 0.695 | 0.000 |

**Note:** AVAI, adoption intention; OC, openness to change; PU: Perceived usefulness; PEOU: Perceived ease of use; P, P-value.
* Indicates a multiplying variable, which means multiply the (independent variable (IV) and moderation variable (MV) to create the interaction term (IV * MV).

## 5. DISCUSSION

Based on the Automation Acceptance Model (AAM), this study aims to analyze the integration of autonomous vehicles into the tourism sector. Although autonomous vehicles offer potential benefits for enhancing the physical and social well-being of senior travelers, acceptance levels in this market remain low. This poses a significant challenge for the automotive industry, which is under pressure to attract new customers, including those from the senior market segment. Seniors are among the fastest-growing groups in terms of travel distance, as noted by (Han et al., 2015; Liew et al., 2021) as they have the economic means to support car ownership and prefer to remain active rather than rely on public transportation (Böcker, van Amen, & Helbich, 2017). Consequently, the purchasing power of senior tourists in the autonomous vehicle market is expected to be substantial. Given that autonomous cars represent a new technology compared to conventional vehicles, there is a need for effective strategies to increase their adoption among senior tourists, taking into account their concerns and preferences. Building on this context, we propose strategies to improve senior tourists' willingness to adopt self-driving cars, anticipating significant benefits for this demographic. This research approach was designed to reflect the characteristics of senior tourists, with the Automation Acceptance Model (AAM) serving as the theoretical foundation for understanding trends in the adoption of automation technology. After evaluating the influence of various factors on the perception and acceptability of autonomous vehicles, the study concluded that each factor significantly affects both perception and acceptance. The findings suggest that AVs have the potential to enhance health, independence, social engagement, and overall well-being among senior tourists.

Researchers found that perceived usefulness (PU), trust (TR), and compatibility (COM) directly influence the acceptance of autonomous vehicles. According to Golbabaei, Yigitcanlar, Paz, and Bunker (2020) and Miller, Chng, and Cheah (2022), usefulness and trust influence the acceptance of AVs across various age groups. Autonomous vehicles are expected to improve mobility, driving, and other related factors. Moreover, to ensure driver safety, maintaining strong trust in the technology is crucial. COM has disproportionately focused on this aspect, neglecting other variables in the analysis of autonomous driving technology, which results in a lack of comprehensive understanding (Iranmanesh et al., 2023). Despite this, considering COM remains essential, as autonomous driving technology needs to align with drivers' habits, routines, experiences, and preferences (Yuen et al., 2020). Senior tourists are more likely to adopt new technologies when they are highly compatible with their existing habits. However, they may find it challenging to fully embrace unfamiliar technologies. Lee and Coughlin (2015) suggest that when emerging technologies align with past and present experiences, they receive them more favorably. Therefore, senior tourists should perceive autonomous vehicles as closely aligning with their existing driving habits, routines, and prior experiences, rather than as a completely new concept. Cognitive decline, which often accompanies aging, can make it difficult for senior tourists to adapt to new technologies that conflict with established routines and habits (Yoon & Cole, 2018). Additionally, when autonomous vehicles replace traditional components, such as steering wheels, manual controls, and familiar displays, with new features, senior tourists tend to experience reduced familiarity and compatibility. This differs from previous studies, which suggest that the perceived ease of use (PEOU) has an insignificant effect on senior travelers' acceptance of AVs. The research findings align with earlier studies that indicate seniors often struggle to accept AV technology (Li, Liang, Wang, Chen, & Chang, 2022; Nastjuk et al., 2020). Additionally, emphasizing driving assistance in AVs, ensuring compatibility with seniors' established driving practices, and building trust—all of which have historically been challenging—will be crucial in engaging senior travelers. Furthermore, developers and manufacturers must prioritize designs that are user-friendly and intuitive for seniors when it comes to autonomous vehicles. This view is supported by the findings of Park et al. (2021), who asserted that reducing technology-related concerns and increasing ease of use will lead to greater acceptance of AVs among seniors.

The indirect effects on senior tourists' acceptance of AVs occur through social influence (SI) and prior knowledge (PK). Additionally, SI predicts the intention to use or accept driverless cars, while their willingness to adopt is influenced by factors such as usability, trust, and compatibility. This study aimed to examine the impact and importance of AVs on senior tourists who have never experienced such technology. Typically, individuals form attitudes for or against new technologies based on the experiences of others (Venkatesh & Davis, 2000). For seniors, suggestions from close acquaintances play an even more crucial role, shaping their perception of autonomous vehicle technology. These close contacts help facilitate and enhance acceptance among senior tourists by offering insights into the usefulness, trustworthiness, and compatibility of AVs with their existing driving habits (Janatabadi & Ermagun, 2022; T. Zhang et al., 2020). Moreover, our research indicates that prior knowledge (PK) plays a significantly influential role in the intention to accept autonomous vehicles (AVs) by shaping factors like perceived ease of use (PEOU) and trust. The more exposure and familiarity seniors have with AVs, the greater their trust and perceived ease of use of such technologies. The study also found that openness to change (OC) moderates the relationship between perceived usefulness (PU), PEOU, and the intention to adopt AVs. These findings align with Ahmad et al. (2021), who reported similar results when comparing the intention to use reservation apps among U.S. and Chinese travelers. In other words, tourists with a higher degree of openness to new concepts are more likely to accept AV technology to enhance performance than those with lower openness. This can be achieved by increasing senior tourists' awareness of the practical uses of these technologies, particularly in driving and mobility. Emphasizing the compatibility of AVs with their prior driving experiences and routines while simultaneously building trust is crucial. Additionally, when those around senior tourists display positive attitudes toward using AVs and demonstrate a thorough understanding of the technology, it significantly enhances the perception and acceptance of these vehicles among seniors. Therefore, it is crucial to develop and implement promotional strategies, such as offering educational initiatives to enhance senior travelers' familiarity with autonomous vehicles and incentivizing current autonomous vehicle users to recommend these vehicles to senior travelers.

## 6. CONCLUSION AND IMPLICATIONS

### *6.1. Conclusion*

This study explores the adoption of self-driving vehicles in tourism using the Automation Acceptance Model (AAM). This research provides valuable insights by assessing social influence, prior knowledge, and openness to change. However, not only hypotheses received support, highlighting areas that require further investigation. The findings underscore the intricacy of autonomous vehicle acceptance in tourism and highlight the necessity for further research to enhance the model. The study concludes with significant implications for both theory and practice, along with recommendations for future research to address the identified gaps.

### *6.2. Implications*

These findings have significant implications for both the automotive industry and policymakers. For the automotive industry, the reluctance of senior tourists to adopt autonomous vehicles highlights the need to target this demographic with tailored strategies that align with their preferences and habits. Companies must ensure that autonomous vehicles designed for senior travelers are user-friendly and emphasize driving assistance and reliability. From a policy perspective, promoting educational initiatives to familiarize senior travelers with autonomous vehicles and encouraging current users to recommend them could enhance acceptance. Additionally, the study suggests focusing on both male and female tourists, who are important consumers in the automotive industry, while also considering health-conscious and socially active travelers who view AVs as a way to improve mobility and address physical challenges associated with aging. Finally, the study concludes that as the affluent senior population continues to grow, so will the demand for travel among seniors. Therefore, developing customized strategies for different segments of senior tourists, considering their unique travel needs and perspectives on AVs, will be crucial for future research and industry practices.

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**Transparency:** The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.
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## APPENDIX 1

### Usefulness

1. The autonomous vehicle is useful for me to drive better than I do now.
2. The autonomous vehicle is useful for me to drive more efficiently.
3. The autonomous vehicle is useful for me to drive more safely.

### Ease of Use

1. It is easy to learn how to drive the autonomous vehicle.
2. It is easy to understand how to handle the autonomous vehicle.
3. I can drive the autonomous vehicle without much effort.
4. Overall, the autonomous vehicle is as easy to drive as traditional car.

### Trust

1. I can trust the autonomous vehicle.
2. I believe the autonomous vehicle is technically verified.
3. Overall, the autonomous vehicle is reliable.

### Compatibility

1. Driving the autonomous vehicle is consistent with my driving inclination.
2. Driving the autonomous vehicle is consistent with my driving routine.
3. The way to drive the autonomous vehicle is similar to that of the traditional car.

### Social influence

1. My friends and families think I should buy the autonomous vehicle.
2. My friends and families encourage me to buy the autonomous vehicle.
3. Overall, my friends and families want me to drive the autonomous vehicle.

### Prior knowledge

1. I am knowledgeable with Advanced Driver Assistance Systems, such as smart cruise control and collision detection.
2. I am familiar with Advanced Driver Assistance Systems, such as smart cruise control and collision detection.
3. I have experience using Advanced Driver Assistance Systems, such as smart cruise control and collision detection.

**Behavioural intention**

1. I will buy the autonomous vehicle when it is commercialized.
2. I plan to drive the autonomous vehicle in the near future.
3. I think I will purchase the autonomous vehicle in the near future.

**Openness to Change**

1. Thinking up new ideas and being creative is important to me. I like to do things in my own original way.
2. I think it is important to do lots of different things in life. I always look for new things to try.
3. I am constantly seeking new and surprise thing in my life.
4. I'm looking for discovery and adventure.
5. I am open to new experience.