Autonomous Vehicle Acceptance Among Young Drivers in Georgia (U.S. state) and its Potential Implications in Customer Segmentation

Logan Vigdorov

Degree Thesis

International Business

2023

Degree Thesis

Logan Vigdorov

Autonomous vehicle acceptance among young drivers in Georgia (U.S. state) and potential implications in customer segmentation.

Arcada University of Applied Sciences: International Business, 2023.

Identification number:

9188

Abstract:

The adoption of fully autonomous vehicles (FAVs) holds great promise for revolutionizing transportation systems worldwide. However, understanding the acceptance and potential implications of AVs among different customer segments, particularly young drivers, is crucial for market success. This paper aims to explore the attitudes of young drivers towards fully autonomous vehicles (FAVs) and analyse their potential implications for customer segmentation. To achieve this, the Unified Theory of Acceptance and Use of Technology (UTAUT) model is employed as a theoretical framework to determine the attitudes of young drivers towards FAVs. The UTAUT model incorporates seven key factors influencing technology acceptance: performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivations, price value, and habit. A survey questionnaire is designed and administered to a sample of young drivers, capturing their perceptions of FAVs based on these dimensions. The findings indicate that young drivers exhibit a lower acceptance of FAVs. Performance expectancy, including concerns related to reliability, safety, and impact on driving experience, emerges as a significant barrier to acceptance among this customer segment. These results have important implications for customer segmentation strategies in the automotive industry. Young drivers who are less likely to accept FAVs can be identified as a challenging customer segment in terms of autonomous vehicle adoption. Addressing their concerns, building trust, and enhancing the perceived benefits of FAVs through targeted marketing campaigns and educational initiatives may be necessary to engage and influence this segment. The results underscore the importance of considering customer segmentation in the context of autonomous vehicle adoption. By

recognizing the unique characteristics and preferences of young drivers, automotive companies can better strategize their marketing efforts and product offerings to capitalize on the potential market opportunities presented by this customer segment.

Keywords:

Autonomous Vehicles
Customer Segmentation
Marketing
UTAUT (Unified Theory of Acceptance and Use of Technology)
FAV (Fully Automated Vehicle)

Contents

1 INTRODUCTION

Customer Segmentation and the Automobile Industry have worked hand in hand for over a century. One of the most well-known, widely deployed market segmentation strategies can be attributed to Automotive company General Motors. In 1920, to compete with competitor Ford's highly successful mass market strategy, they developed a strategy of their own aimed at targeting customers based on price. (Wedel & Kamakura, 2000) By developing multiple models of their cars at different trim levels, it enabled them to cater to customers at every price point, leaving no consumer behind.

This establishment of trim levels, in part, inspired automakers to unleash their creativity. Different classes meant different cars, and the industry quickly began to expand on the idea of advanced automobiles. Luxury represented an ideal cantered around the utmost comfort for passengers. Fancy cushions, extra bells and whistles, and the latest technology were always packed into the most luxurious models. This was not enough for the industry however, designers wanted more. Why should the driver miss out on all the fun the passengers were having.

Hence, the idea of a self-driving car was born. In 1939, at the World Fair, exhibited a vehicle that navigated via radio controlled electromagnetic fields and spikes within the roadway. (Haque, 2023) But without the infrastructure or widespread access to this technology the idea had to be put on hold. It was not until nearly five decades later that humans finally developed complex enough technology to revisit the idea of FAV's. Between 1980 and 2003 basic studies of unmanned transportation within university research canters took place around the globe. The results of these efforts yielded two answers, either highway infrastructure needed to be built in order to accommodate the technology, or the technology built needed to be completely independent of outside infrastructure. Today automotive giant and EV pioneer Tesla, with their enormous amounts of technology and computing power, have employed the sensory systems necessary to navigate today's roads. Although fully autonomous driving has not been fully confirmed yet, they offer features such as emergency braking, traffic aware cruise control and autosteer. (Tesla, 2023)

As the automotive industry continues to prepare and work towards rolling out self-driving vehicles, it is imperative that marketers look to prepare as well. The introduction of this new technology is unlike any vehicle on the market at the moment. Automotive consumers have long been identified as rational. Man's desire for goods exceeds their ability to pay. They satisfy this behaviour by way of finding and maximizing utility. (Goyal & Sadasivam, 2010) Marketers have approached their consumer base with ideas such as luxury, comfort, speed, safety, and overall driver experience in mind. If a consumer was worried about having to operate a vehicle, the alternatives were a bus, taxi, train, etc. AV's strip the need for a driver, and therefore potentially threaten the stability of consumer segments in the automotive industry, and specifically young drivers.

With Autonomous vehicles' introduction to public roads in America imminent, young drivers are likely to encounter them. And this poses a new question for marketers on how they will approach the segments in the automotive industry. When it comes to young drivers, the larger question that arises is, will they accept this technology as much as, say, a new iPhone.

In Georgia (U.S. state), young adults are able to start legally operating vehicles two years earlier than their Finnish counterparts. At 16 years old, a teen becomes eligible to receive a full driving license. There are some restrictions that must be adhered to within the first year such as no driving after midnight and the allowance of only immediate family members as passengers. (Georgia.gov 2023) However, despite these restrictions, the ability to drive at an earlier age strikes pride and excitement into young adults. Having a license and their own car signifies freedom and independence. It brings them one step closer to being treated as a full-fledged adult. And with the drinking age more distant than their Finnish counterparts, young adults tend to savour this privilege even more.

On the contrary, the introduction of fully autonomous vehicles may threaten this unique privilege. Autonomous vehicles boast safety and law-abiding benefits that parents simply would not be able to risk missing out on. It's a scary milestone to allow a child to enter the roads with millions of other strangers. Even with the extensive list of

qualifications that young drivers must go through to attain their license, parents cannot help but worry.

According to the National Highway Traffic Safety Administration, in 2020 alone, nearly 2,000 drivers aged 15-20 years old were involved in fatal car accidents and another 200,000 were injured in an automobile accident. That translates to, out of 11 million young drivers, 1 in every 55 young drivers was injured in an automobile accident. (NHTSA, 2020) While these statistics may seem daunting, safety regulations are constantly being improved in order to prevent these sorts of happenings. Furthermore, the data does not describe drivers at fault, and while it is easy to assume that new drivers with little experience are at fault, human error is present at every age of a lifespan.

1.1 Problem statement

With all of this information in mind on how hard humans have worked to bring this technology to reality, has anyone stopped to wonder whether the world truly wants this technology? Often manufactures and big businesses set their sights on the brightest and newest technology without ever asking their market whether they want it. The very concept of Self driving cars is terrifying, it means putting a human life into the hands of something that thinks in ones and zeroes. Technology has always been a young person area of expertise but getting a drivers' license is considered a rite of passage for young people in America. If self-driving cars were to be implemented, what would happen to that tradition millions of kids get to go through.

The main research question this study is working to solve alongside the problem statement is: What can marketers in the automobile industry expect from the young customer segment when FAV's are introduced to the market?

This poses a serious threat to customer segmentation in the automotive industry. New technology like this, with unexplored boundaries, can completely flip the market upside down. Acceptation of this technology is not guaranteed, and marketers will have to find

a way to better cater to their younger audiences in order to captivate and persuade them to purchase.

1.2 Aim of the study

The aim of this study is to understand consumer attitudes of young drivers in Georgia (U.S. state) to the introduction of autonomous vehicles. Through the method of a survey, the paper aims to collect responses of young driver from Georgia (U.S. state) in accordance with the UTAUT model. Then, analysing the collected data, the paper aims to discover possible correlation between positive attitudes and young drivers in Georgia (U.S. state). With this information the study hopes to better predict the consequences fully automated vehicles will have on customer segmentation within the automobile industry.

1.3 Demarcation

This study does not focus on the governmental regulations that fully automated vehicles will most likely face due to their introduction. These processions are often long and tedious, and due to the nature of the American Government, each state will most likely have their own laws and regulations that they will implement to ensure safe use of this technology. Furthermore, this study focuses on the marketing opportunities and consequences rather than government litigations or law-making policies.

1.4 Definitions

UTAUT: Unified Theory of the Acceptance and Use of Technology (Venkatesh et al., 2003)

FAV: Fully Automated Vehicle

Autonomous Vehicles: sometimes called self-driving cars, it is an automobile that employs driver assistance technologies to remove the need for a human operator. (Cole, 2023)

Customer segmentation: practice of dividing your customers into groups based on certain characteristics and patterns (Das, 2021)

Technology: the application of scientific knowledge to the practical aims of human life or, as it is sometimes phrased, to the change and manipulation of the human environment. (Encyclopaedia Britannica, 2023)

Consequences: a result of a particular action situation, often one that is bad or not convenient. (Encyclopaedia Britannica, 2023)

2 THEORY

Despite the early and strongly conceptual nature of autonomous vehicles in today's world, there have been a wide range of studies conducted about their eventual implications in the real world. Studies regarding engineering, technology, logistics, and even law have all been brought to fruition in hopes of better preparing the world for the official introduction of autonomous vehicles. Paired with that, investigations regarding customer segmentation and attitudes are tirelessly completed time and time again to keep up with the ever-changing market and consumer behaviour.

2.1 Previous Studies

In regard to the extremely new nature of Autonomous vehicles, there are fewer previous studies in the field than the norm. Alas, researchers are always looking to get the jump on new technologies, so studies have been conducted.

As recent as February of 2023 a study was conducted using the theory of planned behaviour, technology acceptance model and unified theory of acceptance and use of technology to discover the acceptance of automated vehicles in middle income countries. In this study, the country of Iran was sampled. The study conducted a survey using the models to better understand the Iranian citizens behaviour towards FAV's and to aid government agencies and transport planners in identifying potential facilitations and/or barriers to the introduction of the technology. The study concluded that a large majority of the population had not even heard of the concept of autonomous vehicles before. But the ones that had, through the survey, supported the introduction of FAVs

with a positive result. And the models used successfully accounted for 70% of difference in intention. (Rejali et al., 2023)

Another study “Using the UTAUT2 model to explain public acceptance of conditionally automated cars” was conducted a bit earlier in 2020 and uses a similar model to map consumers’ attitudes toward autonomous vehicles. The study surveyed citizens in Europe to test the applicability of the UTAUT model in a survey format on the topic of automated vehicles. The research yielded a large amount of data with there being a large number of categories and over 9,000 participants. One conclusive piece of evidence from the paper states that men are more inclined to use automated vehicles over woman when it comes to safety. The study noted, however that habit and pricing were not included as factors due to the scarce number of automated vehicles available at the time of the study. (Nordhoff et al., 2020)

2.2 Customer Attitudes

The difficult thing about customer attitudes is that there are nearly an infinite number of things that can affect them. Things such as preference, manner, disposition, emotion, or stance towards a human or object. (Yuen et al., 2020) With these points in mind, attitude can be organized into cognition, affect, and behaviour. (Hasan et al., 2022). These aspects are considered in the middle of the decision-making process. And it can be assumed the customer’s attitude will either lead them to acceptance or denial when it comes to the product in the end. Noting this, researchers worked to create models that could demonstrate the decision process customers go through.

The theory of reasoned action, developed in 1980, was developed to predict human behaviours covering a large span of subjects and topics. But the model suffered from being too generic. (Marikyan 2022) It failed to take into account factors outside of simply a human’s attitude. A model created to describe human intention in every aspect needs to more direct in what it’s trying to describe. There is simply too much complexity to the nature of human behaviour and ‘reasoning’ behind why human take certain actions.

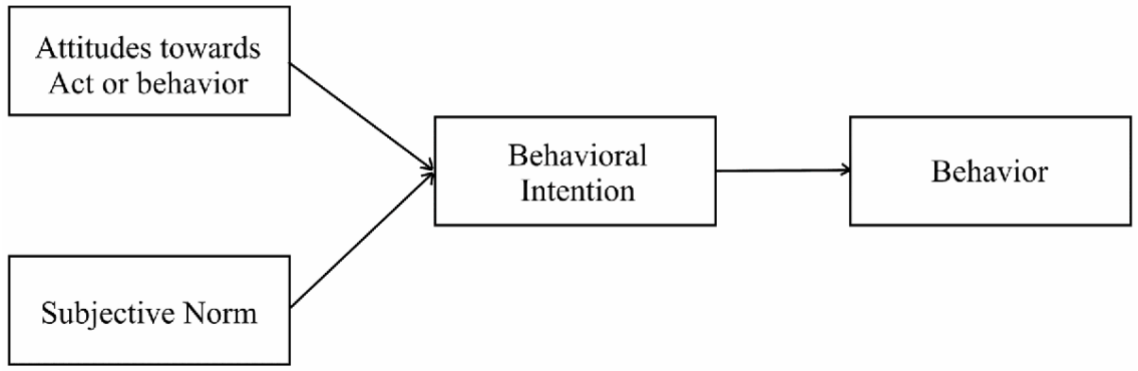

Figure 1: *Theory of Reasoned Action (Al-Suqri, M.N., & Al-Kharusi, R.M. (2015).*

A couple of years later, new researchers created a different model in an attempt to improve the vague nature of the theory of reasoned action. Hence, the theory of planned behaviour was introduced. The theory of planned behaviour split human intentions into six different categories instead of two. With this increased amount of categorical specificity, the researchers hoped the model's success rate in accurately predicting human behaviours would be greatly improved. The model was created for the purpose of explaining behaviours related to the health of humans. This included alcohol and drug use, smoking, and utilization of health services. (LaMorte 2022) But the model still possessed limitations. Among them, in the interest of this body of work, it did not address decisions pertaining to technology and purchase decisions.

The technology acceptance model aimed to fill this gap. It was also derived from the theory of reasoned action made by Fishbein and Ajzen. And using their model as a framework, author Fred Davis, crafted his own model with the intention of answering the unsolved mystery of acceptance and rejection in relation to new technologies. (Chuttur 2009) The decision can often be daunting to a consumer when considering, unlike food for example, technology has a much wider variety of uses and complicated demands to utilize them. In turn, an attitude within a customer can be differentiated between beliefs in two categories: perceived ease of use and perceived usefulness. (Kulviwat et al., 2007) It is important to note that, within this model, perceived ease of use is assumed to have a direct influence on the perceived usefulness of the technology. The model shown below is one of the earliest and most basic forms of the model.

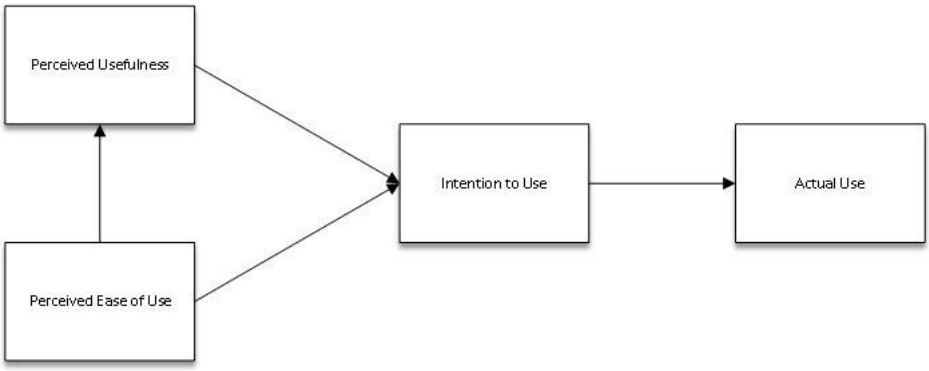

Figure 2: *Technology Acceptance model (Marikayan et al., 2022)*

As years passed, the author continued to refine their model further, adding more categorical variables in order to create a more specific picture for its users. The more complex it became, the more it pertained specifically to the use of information systems.

2.2.1 UTAUT

The unified theory of acceptance and use of technology was originally created only to understand technology adoption in the workplace. Employees who were expected to adopt new technologies to better their performance and make their jobs simpler sometimes experienced struggles with accepting updates to a job they had gotten used to. (Jászberényi et al., 2022)

The model combined aspects of a multitude of technology, behavioural and acceptance models. Eight, to be exact. Each model was individually developed for a specific nook and cranny in the behavioural field of human interaction and their relativity to technology play an equally important part in forming the Unified Theory of Acceptance and Use of Technology. Two of which were the theory of planned behaviour and the technology acceptance model. After commencing an unrelenting investigation of the models, author Verkatesh developed the first instance of the UTAUT. Its original application was aimed at organisational contexts, situations that mandated humans to adopt new technologies. (Kuttimani et al., 2020)

Looking deeper into the model, the original UTAUT takes into account an individual's behaviour towards utilizing a piece of technology. With this, the model assumes that performance and effort expectancy, social influence and facilitating conditions are all

influenced by the subject's behaviour. (Nordhoff et al., 2020) Each of the four pillars contribute external factors that are to be acknowledged when considering a consumer's behaviour toward new technologies. In addition, the author added four moderators, age, gender, experience, and voluntariness of use. The addition of the moderators served as a benchmark for users of the model to develop a more complex image of their subjects.

Although the moderators demand basic information, their complexity arises when they are applied to the pillars. Before behavioural intent can be determined from each pillar, the application of the moderators that apply are contemplated to build a more rounded picture of the user in an attempt to understand their background and detect possible variations that can affect the data. (Molnar et al., 2013) Three of the pillars, performance expectancy, effort expectancy and social influence are taken into consideration preceding the use of the technology. But because the model illustrates employees using technology in a work place, facilitating conditions do no contribute to behavioural intention in a user and can be applied to use behaviour without precedence.

The first of the four pillars, performance expectancy arises when users are considering a new technology. Consumers carry a certain expectation for how the technological product can benefit them; Can it shorten wait or processing times and can it perform the job better than it was already being performed. Effort expectancy, the second pillar, directly calculates in after performance. With these perceived performance improvements, what effort will it take the consumer to learn and adapt to this technology. After the learning has been completed, will the effort to operate the product remain the same, or change in a positive or negative nature. Pillar number three, social influence, plays on the inherently social nature of humans. As social creatures, the standing in a community in which one chooses to surround them with remains an important factor in any life decision. Could adapting to the new technology boost one's social setting, or on the contrary, damage a reputation. Finally, as a consumer ponders the previous three pillars, they must allow for the possibility that they do not possess the resources to fully operate the technology. Be it, whatever it is, the product will require some sort of power or other resource contribution. In the context of the model, facilitating conditions are the responsibility of the organisation and do not affect the initial intention of the user. Following the fulfilment of the four pillars, the ensuing

consumer's decision to utilize or not utilize the product will have followed the UTUAT model. (Nordhoff et al., 2020)

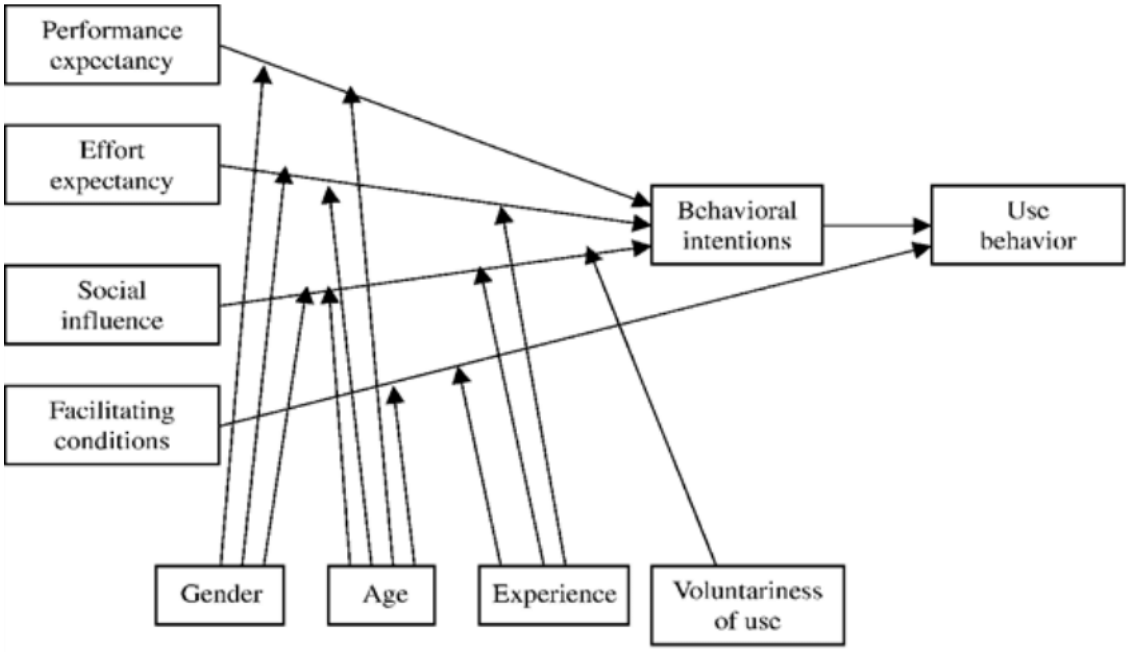

Figure 3: *Unified Theory of Acceptance and Use of Technology model (Venkatesh et al., 2003)*

As can be seen in Figure 3, each of the four figures ultimately contribute to the subject's eventual use behaviour, with demographic conditions gender, age, and experience, as well as voluntariness of use based on organisational mandates playing an informal role in their factors before final determination. Facilitating conditions does not play into behavioural intention in the original model thanks to the organisation in question is responsible for the conditions the user is faced with. This model could only be applied to the workplace and there were still components missing to allow the model to be applied outwardly.

At the time of the model's inception, 2003, technology remained widely impersonal, waiving the demand for the model's expansion. Inevitably, technology evolved its way out of workplaces and quickly established a more personal reputation. The original UTAUT model did not have the ability to focus on the personal aspect and grew obsolete, desperately calling for a revision. In 2012, with improvements and adjustments, the model was reimagined with the new aim to dissect technology acceptance outside of a workplace setting. Without mandates from employers, the

model scrapped voluntariness of use. (Kuttimani et al., 2020) Therefore, Hedonic motivations, price value, and habit were added to the model creating a model that could be applied to any individual creating new experiences with unfamiliar technology. (Nordhoff et al., 2020)

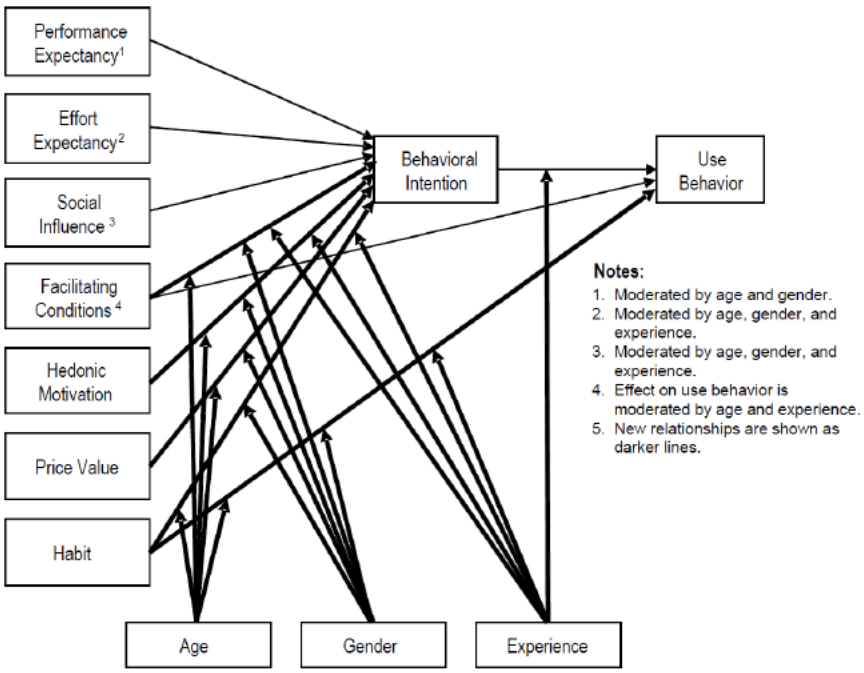

Figure 4: UTAUT2 (Venkatesh et al., 2012)

With the addition of three new pillars, the model called for the addition of corresponding arrows to each pillar from age, gender, and experience. Even with the elimination of voluntariness of use, the model became crowded with the extra arrows. In turn, notes were added to ensure the understanding of previous relationships dating back to the older model while still clearly illustrating the new relationships. Some notable changes, along with the new pillars and removal of voluntariness of use, included a connection of facilitating conditions to behavioural intention. Without an overarching organisation to mandate the use of technology, users being evaluated with the model had the new responsibility of managing the facilitating conditions that came with using the technology. This included things such as powering the technology and even setting it up upon retrieval. Therefore, the moderators must be applied to facilitating conditions unlike the original UTAUT model. In order to accurately capture the essence of the UTAUT, the user must apply these categories in a format the recipient can understand, and file results under each category. Under a survey format, a researcher would take the four main pillars, along with the three new pillars, and devise a group of questions

pertaining to each pillar. By basing questions off each of the pillars and organizing the survey into 7 segments, the researcher could efficiently extract a consumer's attitude towards a piece of technology, whether it is in the workplace or not.

2.3 Customer Segmentation

Customer segmentation, also referred to as market segmentation, is used by nearly every successful business in the economy. It is a process that refers to dividing a company's main group of customers, into smaller sects in order to gain a better understanding of who those customers are. (Das, 2021)

With a better idea of their identity, marketers can then work to target specific groups with marketing campaigns that are aimed to convince them specifically as to why they should buy the product that is being sold. For instance, an elderly couple is less likely to be in the market to buy a brand-new minivan with plenty of seats to cart extra people. It can be assumed that their children have most likely moved out and have begun their own lives. Meaning a minivan would be a waste of space for an elderly couple. However, that elderly couple's children may have children of their own that they need to take to everyday activities meaning a minivan would be better suited for them. Therefore, if an automobile company were to segment their customers and curate minivan ads for younger couples with children, they are more likely to have a higher success rate.

Importance in customer segmentation takes the form of considering value proposition, which customers to deliver value to, as well as how to single out and reach these customers. (Chan 2008) The very basis of segmentation is to find the right customers to market to. Once found, companies should make it a priority to bring these customers in.

2.3.1 Different Types of Customer Segments

Customer segmentation is a very fluid business model. While the overarching concepts of dividing customers in order to isolate marketable advantages and provide specific value remain sturdy, actually carrying out the act of dividing can take many forms. Researchers have attempted to cage the beast that is customer segmentation for decades. Historically, demographics were first most commonly employed as a segmentation

technique due to ease of access and storage of such statistics. However, as time progressed, so did technology. Purchase behaviours such as age, consistency, and even price of transactions all became possible to segment. (Joung & Kim, 2023)

Among the plethora of options companies must segment their customers, four main segmentation methods are prevalent in most markets. The predecessor, demographic segmentation is accompanied by geographic, psychographic, and behavioural segmentation. Instead of focusing on time, US researcher Nielsen Claritas founded a forward-thinking theory abbreviated PRIZM that aimed to orient residents in reference to education, affluence, family life cycle, urbanization, race/ethnicity, and mobility. His segmentation framework, operating on a geo-demographic approach, helped companies of the likes such as Hyundai and Barnes and Noble to find success in the American market. (Wedel & Kamakura 2000) Segments are subjective to the company that is utilizing them. A company selling electronics will have different segments than a company selling beds.

2.3.2 Demographic Segmentation

The first and most commonly referred to form of segmentation is demographic. Demographics refer to a consumer's age, gender, income, career, education, religion, race, or nationality. (Gadekar, 2016) Businesses utilize demographics to organize and strategically target their customers. It is understood that two customers the same age can possess different interests, but on a larger scale statistically share more things in common than customers of different ages. Two teens may prefer different TV shows, but both need school supplies, whereas a middle aged consumer will be far less likely to. Similarly, two friends may be different nationalities but follow the same religion and need food that is accepted within their religion.

Demographics contain a wide range of differences stemming from the diversity of humans. It has become increasingly important for businesses to conduct diligent research around their customer base in order to form a clear idea of who they are marketing to. Businesses that devote time towards identifying demographics within their customer base reap the benefits that follow with successful marketing schemes and discovering a loyal customer base.

2.3.3 Geographic Segmentation

Geographic segmentation involves more than simply a customer's place of domicile. Detailed factors within their location such as food, language, or even holidays play a vital role in geographic segmentation. (Gadekar, 2016)

Companies must take careful approaches when marketing in different areas. Popular American pizza company Dominoes was forced to withdraw all of its locations from Italy in 2022 after struggling to compete with local pizza restaurants. (Hoskins, 2022) The product Dominoes offered simply did not compare to what the Italian market wanted. They were interested in preserving their culture and had no need for the American retailer. The marketers at Dominoes likely did not conduct proper and thorough research of the Italian pizza market and ultimately realized the consequences. Seasonal changes and differences are also a part of geographic segmentation and play a major role for companies looking to expand internationally. (Gadekar, 2016)

It is important to understand the winter in the US is not the same as winter in Australia, and proper geographic segment research will save a company from making such a mistake.

2.3.4 Psychographic Segmentation

A market divided using categories of social class, lifestyle, or personality characteristics is commonly referred to as a psychographic segmentation. This form of segmentation is unique because it provides marketers with highly useful market aspects to better comprehend consumers and their behavioural patterns.

Psychographic segmentation is often useful before or after a consumer makes a purchase. This segment outlines a consumer's behaviour before or after they make a purchase so that a company can tailor the buying process more effectively to the consumer to increase loyalty. (Gadekar, 2016)

Consumers who often spoil themselves with a lavish lifestyle and wear expensive clothing and drive expensive cars tend to fall in a higher social class and have cultivated a certain lifestyle for themselves. When this consumer makes a decision on where they

want to eat, their search will lie within companies who offer experiences with fancy settings and loads of accommodations. A company targeting this segment can react to this by creating a luxury experience set with a multitude of add ons, and a regal setting for the consumer. They will then be prepared for their consumer when they arrive and deliver the best possible experience.

2.3.5 Behavioural Segmentation

Whether a consumer is product centric or not, determines behavioural segmentation in the marketing world. Everything from the amount of knowledge of a product a consumer has, to their attitude, and their response to the product are examples of behavioural segmentation. (Gadekar, 2016) This segmentation method provides intricate cognitive information on a desired customer segment within the market and requires some amount of previous knowledge and data to form a segment and an idea of which group a company is aiming for.

A common aspect that is considered when identifying a behavioural segment is purchase readiness. The diffusion of innovations theory was created to define a consumer's "readiness" in the buying process. Since doing so, the theory has climbed, in a way that is anything but surreptitiously, to the top of the marketing totem pole. Mr. Everett Rogers began sorting consumers with regards to what point they decided a purchase a product in its life cycle. From the beginning, innovators were categorized as the group to buy with no risks in consideration. The opportunity to get their hands on a new product far outweighed the financial toll it would take to do so. After came early adopters, shoppers who possessed a similar ambition to their predecessors, but perhaps lacked the financial means, information, or awareness. Following closely, the early majority, witnessed that the product had reach the masses and these imposter trendsetters chose to jump into the mix. Next, the late majority consisted of the practical people, those who've waited to see the cost to benefit ratio the product provides, or they were typically fashionably late personality. Finally, the laggards contained the overly cautious, the sale motivated, the major sceptics who still wanted to be a part of the fun. (Planaska & Gamma 2022)

With these five consumer groups, companies can develop a timeline and track customers' purchase behaviours and better target those who purchase early with trendy ads, or those who purchase later with sales pitches. Among purchase readiness, other aspects of behavioural segmentation include loyalty status and level of consumption. According to their behaviour, a customer with a high loyalty status is more likely to return and purchase again from the same company, as well as a consumer that has a higher level of consumption.

2.4 Summary of Theoretical Framework

As time passes and marketing evolves, customer segmentation continues to become increasingly complex. It is not uncommon to see different segments combined to formulate an even more specific target market for businesses. US researcher Nielsen Claritas founded a forward-thinking theory abbreviated PRIZM that aimed to orient residents in reference to education, affluence, family life cycle, urbanization, race/ethnicity, and mobility. His segmentation framework, operating on a geo-demographic approach, helped companies of the likes such as Hyundai and Barnes and Noble to find success in the American market. (Wedel & Kamakura, 2000) Segments are ultimately subjective to the company that is utilizing them. A company selling electronics will have different segments than a company selling beds.

In summary, the theoretical framework that will guide this paper through its investigation combines the extensive research behind consumer attitudes and customer segmentation. Consumer attitudes can be affected by a number of variables such as behaviour and cognitive processes, and the models of TAM and UTAUT have been developed to organize the thoughts of consumers and better predict their attitudes towards new technologies. Using the UTUAT model as a central framework for the paper, and the TAM and TPB as background influences, the paper will employ their intricacies in a survey format. These theories have been developed to better understand customers and their tendencies to adopt new technologies, the paper will apply them to modern consumers to learn their attitudes towards autonomous vehicles.

Furthermore, customer segmentation refers to the division of a consumer base based on certain descriptive factors like age or religion in order to more accurately cater to the

consumer. In doing so companies save money by avoiding the mistake of marketing a product to consumers who are not interested.

With the information learned from current consumer attitudes to new technology on the horizon, and detailed background on consumer segments, the paper will approach the young customer segment with the intent to draw conclusions as to what can be expected of their behaviours and attitudes towards the technology when it finally releases.

3 METHOD

The pillar of every method of study is the choice of either qualitative or quantitative. While most papers combine the two aspects in order to better define their population and answer a research question, one or the other is primarily selected in order to provide direction to the study. When working to determine consumer behaviours and thoughts, it can be difficult to decide on which research method to use.

Consumer attitudes has the possibility of being defined as a qualitative variable. The wide range of definitions that go into behaviours and its intricacies can be infinitely explored with a qualitative study. But as established in the theory, behaviours and feelings can be affected by a wide range of factors, which was organized the the UTUAT2 model. So, with the model working to keep the qualitative variables under control, the study can work to solve the quantitative implications of autonomous vehicles.

Mixing of qualitative and quantitative research is quite common in the research community. Some researchers have denounced this research as confusing, but “Biesta provides seven dimensions at which mixing might take place: Data, methods, design, epistemologies, ontologies, research purposes, and practical orientations.” (Coe et al., 2017)

By design, this paper works with both qualitative and quantitative variables and experiences some mixing. Solving how young drivers’ attitutudes are towards FAVs as a whole places importance on the consideration of the quantitative implications that

come with it. Previous studies in this field similarly use a quantitative survey method of research in order to answer their research questions.

3.1 Choice of method

The method that was chosen for this research paper is a survey. The reason for choosing this method was to gather a large sample of young drivers in order to more accurately gather data to represent the entire population of young drivers in Georgia (U.S. state). The aim of the paper is to establish a pattern, attitudes of young drivers towards FAV, throughout a population, young drivers in Georgia (U.S. state). (Coe et al., 2017)

The format of a survey aims to attack the fleeting and temporary nature of a typical young person's attention span. The survey used is a questionnaire with inquiries directly relating to the model for UTUAT with the intention of defining the consumer's attitude. Furthermore, surveys are easily distributable through social media and internet channels, that of which the "young" segment this paper aims to target frequently utilize. The survey, using the UTUAT model as a guiding light, inquires the young driver segment in larger numbers than an interview could.

While an interview could solve the deeper intricacies that accompany consumer behaviour, the end goal of this paper is to determine their overall attitudes towards autonomous vehicle technology to define their impact on customer segmentation. Therefore, a quantitative survey better works to solve the papers inquiries.

3.2 Respondents

The respondents for this research paper were accessed and selected via the snowball method. The snowball sampling method selects a set of respondents and then relies upon their recommendations to other participants to garner an appropriate sample size. (Coe et al., 2017) The initial release of the survey was given through social media channels. Instagram and Facebook were the main social media channels used. The survey was shared through a link that could be accessed by tapping on it whilst viewing a "story" or by going to the social media profile and accessing it through the bio. After

the survey was completed, respondents were then encouraged to share the survey with friends and family using their own social media channels or by text.

This method was chosen due to the strictly online nature of the survey. The survey was conducted remotely in order to reach the population of Georgia (U.S. state) and to garner as many respondents as possible in order to create a satisfactory sample size to represent the total population of young drivers in Georgia (U.S. state). The desired age range of respondents to fall under the category "young drivers" was between 16-25. This, taking into consideration, the particularly young age that drivers in America are able to join the roads. (Georgia.gov, 2023)

3.3 Questionnaire

The survey (see Appendix 1) was built into eight separate sections in order to separate the collected data and allow for easier organization and analysis. The questionnaire was presented this way to consumers in order to avoid confusion and keep some form of cohesiveness and flow to the survey.

The first section of the survey presented gathered basic data of the respondents. Age, driving experience, and knowledge of autonomous vehicles were among the basic information questions gathered. These were used to segment the respondents and aid in phasing out any responses that were not pertinent to the study. The first section was also used to formulate an image of the experience and feelings of drivers on the road. By splitting the drivers according to their road worthiness, it alleviates some of the pressure of building a consumer profile around different drivers as their behaviours and future responses may be influenced by this.

The other seven parts of the survey utilized questions pertaining to the central theoretical framework of the paper, the UTUAT model. The questions were modelled around the different sections of the framework and formatted with a 5-point scale survey. The respondents had the option to answer the question with 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree. The survey purposely avoided the 7-

point Likert scale with the intention of steering clear from the potential obstacle of respondents feeling overwhelmed with the amount of options to choose from.

The questions in each separate pillar were formatted using the funnel method. The funnel method begins with general, more open-ended questions to allow the respondent to begin to build an image of the scenario. Then, using details from previous question, each probe becomes more specific until, finally, the final question addresses the main point. The final question was the focal point the entire time, but if the previous questions were not asked to set the scene, then the respondent may not have responded in the same way. The initial questions disarm the respondent and relax them into a state of true honesty so that the respondent can display their true feelings towards the primary inquiry. (Manktelow & Carlson, 2022) The funnel method was chosen for the sake of revealing respondents' true feelings towards a potential life with FAV's and the fate of their acceptance.

3.4 Analysis of the data

This study uses quantitative analysis to process and understand the data it received via the survey questionnaire. The survey is presented in Google Forms and the corresponding data is transferred to Google Sheets. The data begins as raw data from the survey and is processed in Google sheets in order to create numerical data that can be analysed to derive specific meanings.

The data points that are secured and processed are presented as a mean average for each question from the 1-5 scale presented to the respondents, one being strongly disagree and five meaning strongly agree. According to Saul Mcleod from the University of Manchester, this method possesses the strength of allowing the respondent to give degrees of opinion or even no opinion at all. In turn, quantitative data can be obtained, creating an easier analysis process. (Mcleod, 2023)

The means of the questions are taken and applied to each overarching pillar to determine the respondents behaviour as it pertains to each pillar. The initial demographic questions representing the moderators of the UTAUT model are gathered and organized into pie graphs to differentiate respondents. After the moderators have

been applied to each pillar and the mean data points for each question is processed within its respective pillar the ensuing data is used to further analyse the attitude of the respondents toward the questions and ultimately their overall attitude toward FAV's.

3.5 Validity and reliability

Validity can be split into two categories, internal and external validity. Internal validity refers to the strength of the reliability the research has on representing the population it is working to investigate. If the sample taken does not accurately represent the population, then the study lacks internal validity. External validity answers the question of if the body of work applies to a different set of participants from the same population. In other words, can it be applied and yield similar results. (Patino & Ferreira, 2018)

Validity in this study is defined by consumer attitudes of young drivers towards autonomous vehicles. The conduction of a survey aimed at young drivers with the intention to discover their thoughts and feelings towards such technology works towards proper validation. Through the questions used in the survey, which can be found in the appendices, the survey commands the ability to ensure validity by asking targeted questions related to the theoretical framework. Using these questions, the survey is able to answer the desired research questions while avoiding veering off topic or collecting data that does not pursue the truth of the problem presented in the paper. However, validity does not hold a weighted value if it is not accompanied by reliability.

Reliability defines whether or not a body of research produces stable and consistent results. (Dudovskiy, 2022) Reliability in this paper's context can be defined by how accurately the data is collected. One of the issues that was tackled in order to achieve reliability was the choice to opt for the 5-point scale instead of the 7-point Likter scale. This change strived to minimize human indecisiveness and provide clear answers to choose from for every respondent. In addition, the splitting of the questionnaire into eight small sections assisted in guiding respondents' attention to each section equally and allowing for a thinking reset in between sections.

Validity and Reliability in this study were achieved by way of thoroughness and transparency when developing and conducting the survey. Using specificity in the

inquiries and accounting for error and bias, the study worked to keep the margin of error as minimal as possible.

3.6 Ethics

Research ethics were taken into serious consideration when conducting the necessary research to answer the questions this paper presented. The handling of all data was carefully planned out before collection. The safety, comfortability, and consent of the respondents were marked and carried out as top priority. The research strived for absolute transparency between the researcher and respondents while ensuring the confidentiality and anonymity of every respondent. Respondents were provided the email of the researcher in order to guarantee they received an outlet to contact the researcher if they wanted to rescind their participation from the survey. No personal information was asked of the respondents, and they were simply asked basic demographic questions for the benefit of the study. (Milden, n.d.)

Participation was exclusively detailed as non-compulsory urging participants to participate at their own discretion. Data storage was also controlled emphasizing that the researcher was the only one with access to the data and emails would not be included in the appendices. Data was collected through the survey site and transferred to a secure file that only the researcher had access to.

4 RESULTS

This section of the research paper contains the results of the study. The study set out to conduct a survey on young adult drivers in Georgia (U.S. state) between the age of 16-25. The moderators are presented first to craft a better picture of the survey population and how well it represents the young driver population as a whole. Results from the UTAUT section of the survey are presented in accordance with the funnel question method. The final question from each pillar is taken and the responses are averaged to determine whether young drivers agree or disagree with the statement. And ultimately place their feeling in each pillar towards the acceptance and use of FAV's.

4.1 Overview

The survey was carried out over the course of nine days. From April 6th to the 15th, 2023, respondents had the chance to respond to the survey. In the nine days the survey was publicly available to take, through the use of the snowball method, the study was able to gather 99 unique responses. While the survey was designed to target young drivers in Georgia (U.S. state), due to the public nature of the survey, some responses did not fall under the desired scope of the survey due to either age or geographic location. In order to preserve the validity and applicability of the survey to the study, the invalid responses were filtered out prior to analysing the results. With thirteen of the responses not adhering to the requirements of the study, after having been successfully filtered out, the total responses was brough to 86.

4.2 Moderators

When looking at the moderators of the UTAUT model, the data provided some interesting points to look at. By a small majority, men dominated the demographic of respondents. Of the men and women that replied to the survey, a majority 63% of respondents claimed they knew what FAVs were. After, respondents were provided with the definition of an FAV to maintain the validity of the study. With this definition, and on top of their previous knowledge of FAV's for those that has it, the respondents were probed whether they had ever ridden in one. 15% of respondents claimed to have ridden in an FAV before. The average age of respondents was between 19 and 20 years old. This is one the lower end of the 16-25 age range and can be reflected in the years of driving experience.

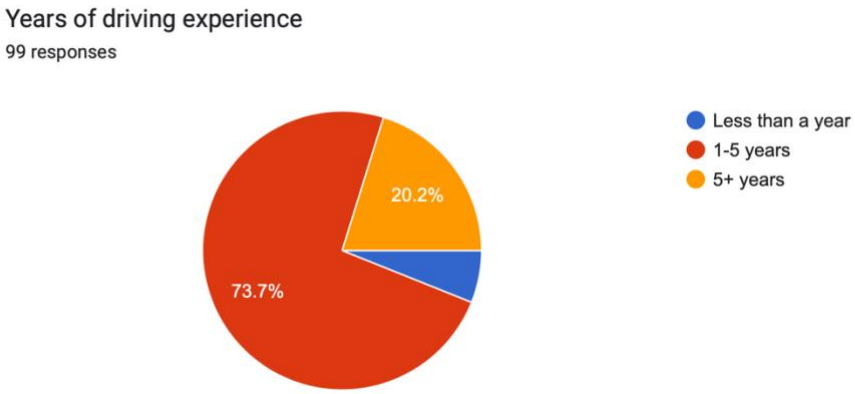

Figure 5: *UTUAT Experience Moderator results Part 1 (2023)*

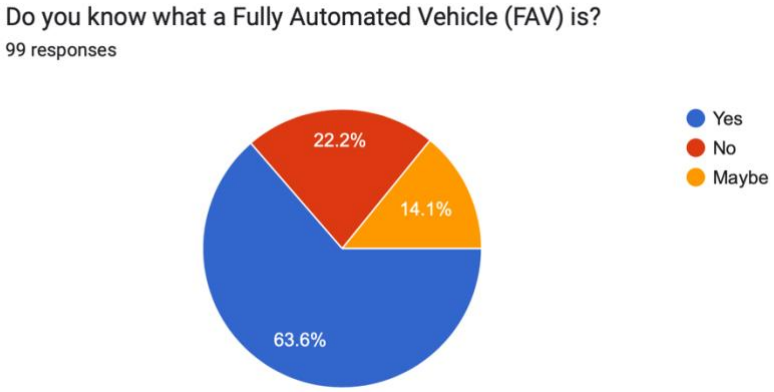

Figure 6: *UTUAT Experience Moderator results Part 2 (2023)*

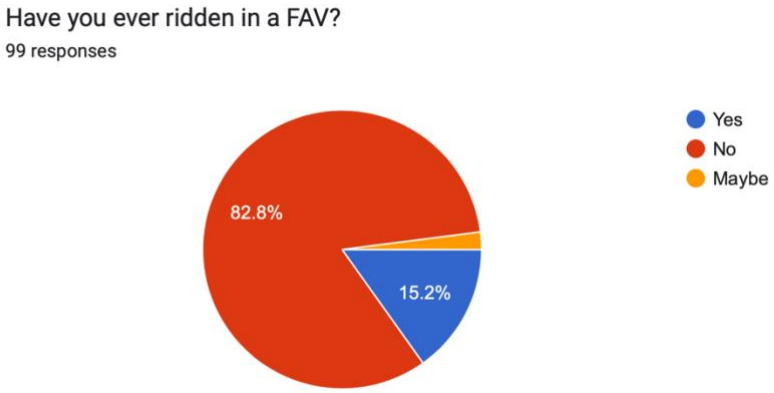

Figure 7: *UTUAT Experience Moderator Results Part 3 (2023)*

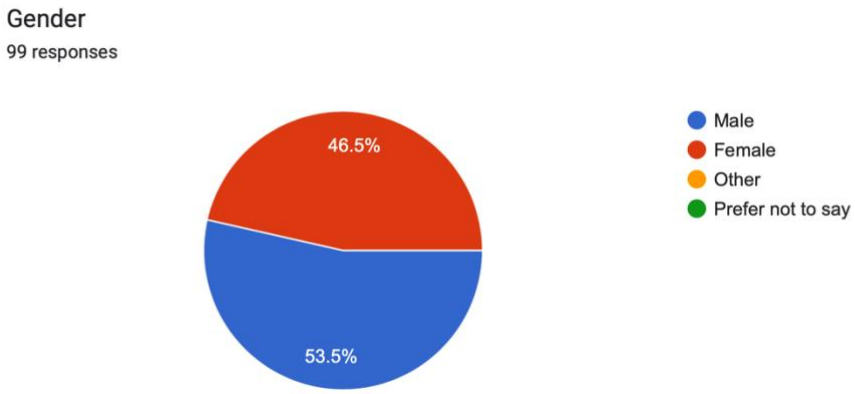

Figure 8: *UTUAT Gender Moderator results (2023)*

4.3 Table

Below, Table 1 can be seen presenting the results of the study. As the funnel questioning method was used, the average answer from the 1-5 scale is presented under each pillar. Each answer represents the survey body's feeling towards FAVs in each category. Below Table 1, figures for each of the pillars are shown to create a more detailed picture of how young drivers feel towards FAV's and what marketers can expect from the young driver segment when FAVs are introduced to the public.

Table 1. Survey result averages divided by pillar

Survey Result Averages	Scale 1-5 1-Strongly Disagree 5-Strongly Agree
Performance Expectancy	2.32
Effort Expectancy	2.45
Social Influence	1.68
Facilitating Conditions	3.2

Hedonic Motivations	3.3
Price Value	3.24
Habit	3.18

4.4 Pillar Review

Below, each pillar has been converted to a bar graph in order to visualize the results from the survey. The bar graph shows the amount of respondents that chose each numerical value in the 5-point scale with the intention of revealing the true nature of young drivers' opinions towards FAVs. Below each figure, a brief, concise description is utilized to decipher the true nature of the figures. With this, the survey displays the results both visually and in a reading context unlocking the most possible observations.

4.4.1 Performance Expectancy

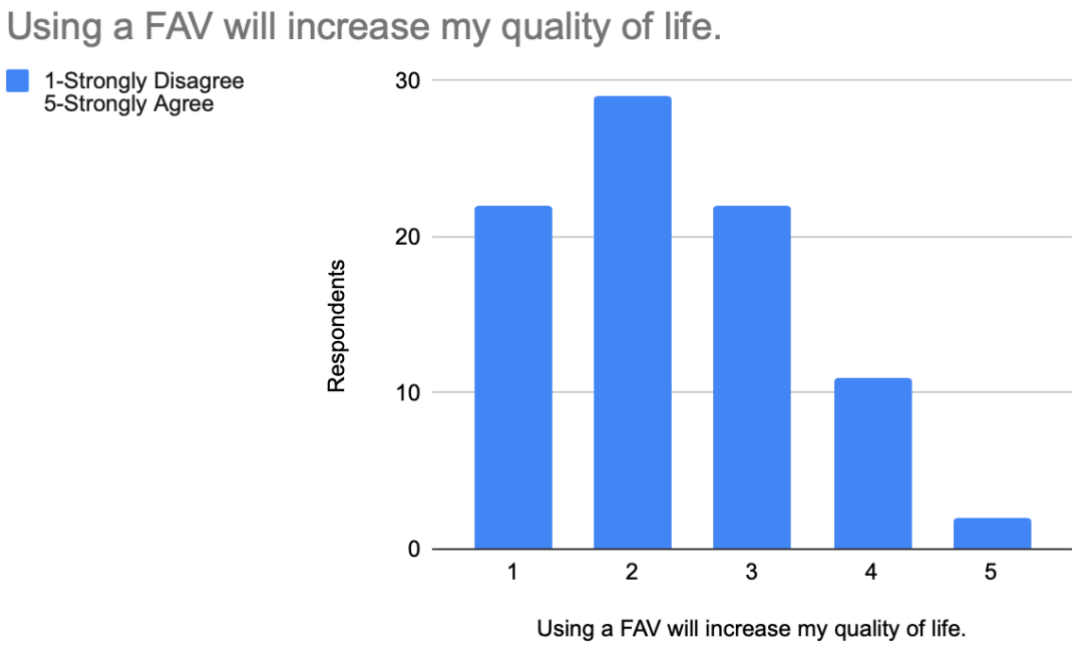

Figure 9: *Performance Expectancy results (2023)*

Respondents were asked about how they felt FAVs would affect their quality of life. This question represented the first pillar, performance expectancy. After answering the previous questions of the funnel, respondents were probed if they thought FAVs could increase their quality of life. Very few respondents agreed that FAVs would improve

their quality of life through performance expectancy. A majority of the respondents disagreed with the statement, and inherently felt that FAVs would have either no affect or a negative effect on their quality of life. 22 of the respondents felt indifferent on whether FAVs would increase their quality of life.

4.4.2 Effort Expectancy

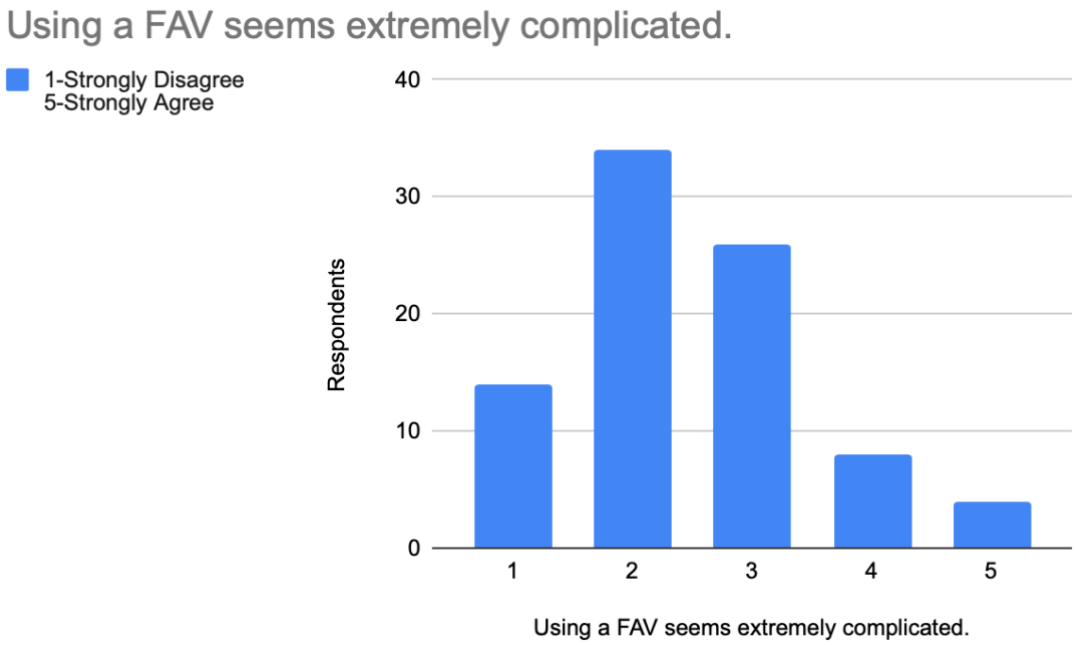

Figure 10: *Effort Expectancy Results (2023)*

The second pillar, effort expectancy, contained the focal inquiry "Using a FAV seems extremely complicated." Survey takers were tasked with choosing whether they felt that FAVs would require a large amount of effort to learn how to use which could affect their behaviour. Less than five of the 86 respondents agreed that using an FAV seemed complicated. The majority of the sample did not feel that using an FAV would be complicated.

4.4.3 Social Influence

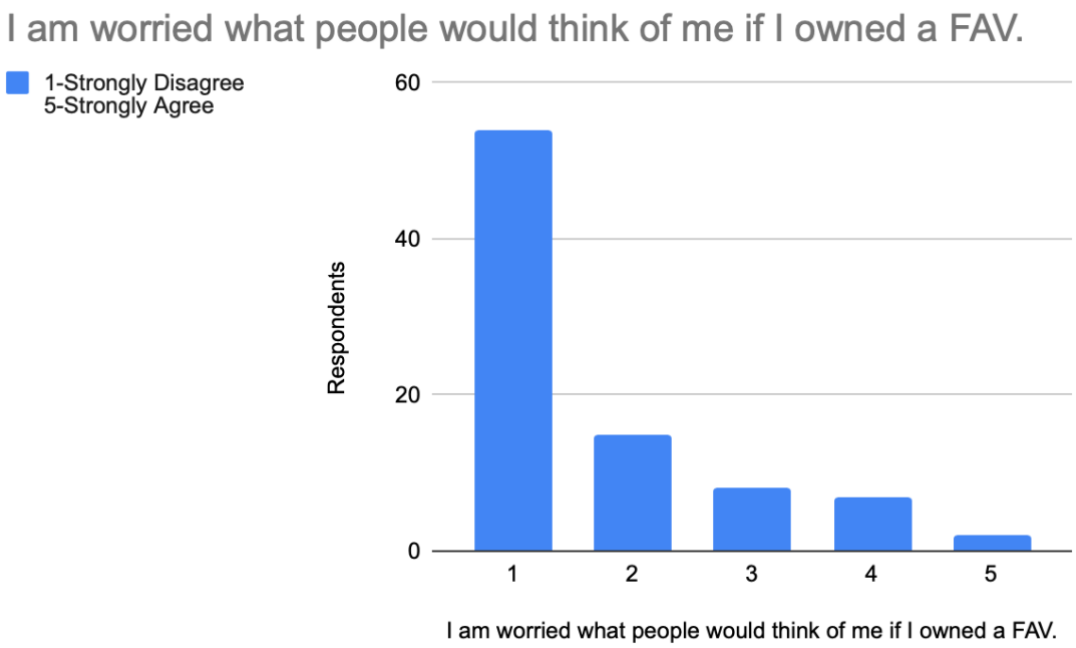

Figure 11: *Social Influence Results (2023)*

Respondents almost unanimously disagreed with the statement "I am worried what people would think of me if I owned a FAV." A total of 69 young drivers did not find what others would think if they owned a fully automated vehicle worrisome. The data set possessed an outlier of two drivers who would not purchase an FAV based on what others would think of them.

4.4.4 Facilitating Conditions

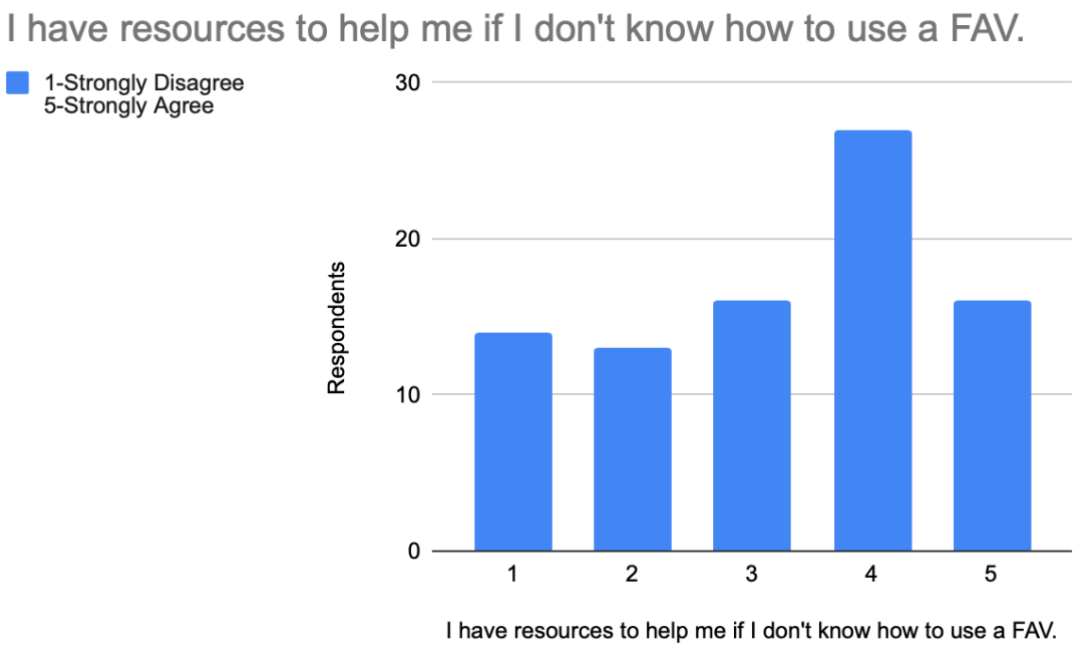

Figure 12: *Facilitating Conditions results (2023)*

The facilitating conditions pillar, possessing the necessary tools to own and operate a vehicle, probed young drivers whether they felt that could meet these conditions. Survey respondents were encouraged to think about the current resources they possess in order to accurately gauge their facilitating condition. Results were spread very evenly between agreement and disagreemant. Exactly half, 43, of the respondents claimed they have the necessary resources in order to facilitate owning an FAV. A smaller number of the population felt they would be ill prepared, if they were to come upon owning an FAV.

4.4.5 Hedonic Motivation

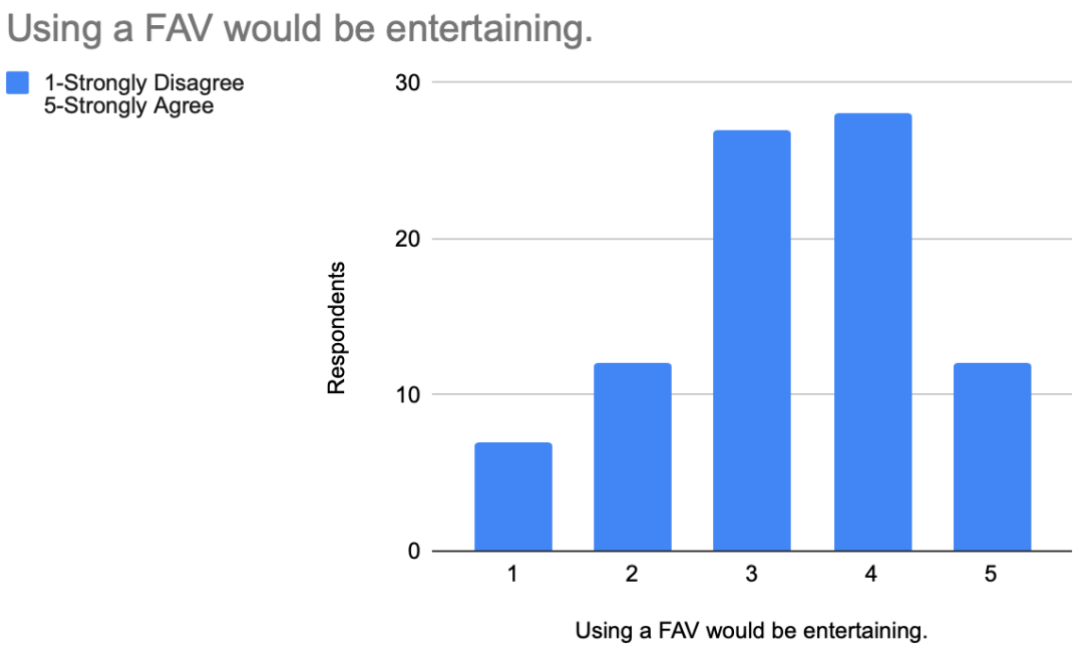

Figure 13: *Hedonic Motivation results (2023)*

The intention of this pillar was to discover young drivers' opinions on the "fun" that FAVs could provide. When asked if "using an FAV would be entertaining," 27 respondents did not agree or disagree with the statement. With just one more, 28 respondents agreed that using an FAV would be entertaining to some degree and felt a positive hedonic motivation towards FAV's. Seven of the surveyed held no belief that FAV's hold any hedonic motivation whatsoever.

4.4.6 Price Value

Figure 14: *Price Value results (2023)*

Respondents were asked earlier in the funnel what circumstances would be necessary in order to purchase an FAV. They were also asked to ponder their purchase decisions when it pertained to regular cars. This was in order to build an accurate picture of what buying an FAV would be like and if they were truly willing to do so. According to the results of the price value pillar, 40 respondents would be willing to dig deep into their pockets in order to purchase an FAV. As opposed to the 21 respondents who would only consider purchasing an FAV if they were presented with a special deal.

4.4.7 Habit

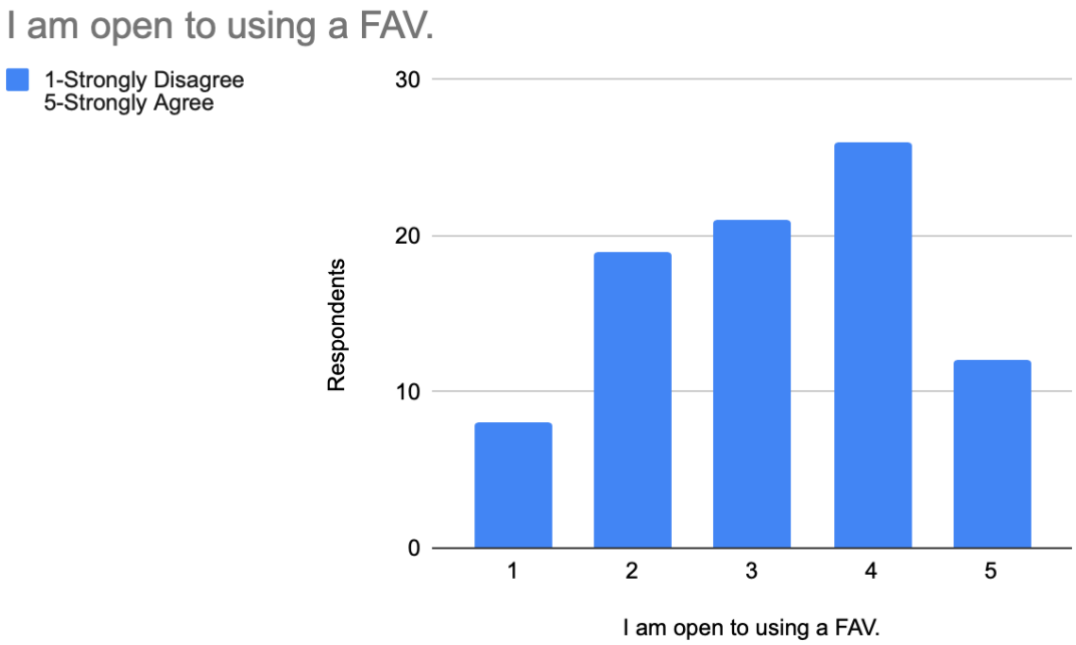

Figure 15: *Habit results (2023)*

For the final pillar, respondents were once again asked to look inward and observe their habits. As FAV's have not been released to the public yet. The funnel began with probing respondents on their current habits with regular vehicles. At the end of the funnel however, the survey takers were asked to compromise those habits, for the newer technology of FAV's. 12 respondents wholeheartedly agree that they would use an FAV, with another 26 respondents being ready to take the leap. On the other side of the scale however, eight respondents strongly disagreed with the idea of using an FAV. This follows the trend of the seven respondents who also felt no hedonic motivation towards FAV's

5 DISCUSSION

In the discussion chapter, the study works to dissect the results of the survey. Connecting dots in order to find similarities and differences in the data. And to ultimately determine young drivers' potential acceptance of FAV's. This section will

also use previous studies in the field to compare results and gain a better understanding of how this survey stacks up against earlier research.

5.1 Discussion of Results

This chapter begins the discussion of the results that were attained from the survey. First, the chapter details the effects the moderators on the pillars of study. By covering this first, the study creates an oppurtunity to analyze the pillars more transparently, without the need to constantly refer back to the moderators. Then, using the precvious studies mentioned in the theory chapter, the paper will carefully interpret the results as it pertains to each pillar and how it contributes to the paper overall.

5.1.1 Results and moderators

One of the first statistics that immediately stood out was the proportion of men to women who partook in the survey. Male respondents outnumbered female respondents, claiming the majority with 53.5%. This was a surprising statistic considering, according to a survey conducted in Georgia (U.S. state) in 2017, of the 7 million drivers on the road in Georgia (U.S. state), there were 300,000 more women driving than men. (Carlier 2021)

Pertaining to the experience moderator of the UTAUT model, over half of the respondents that took the survey were already previously aware of the existence of FAV's. This can be attributed to the fact that, in a digital age word spreads quickly and easily of technological inventions, and the age range for this demographic is highly connected on the internet. Large companies have been pursuing the technology for some time, and in an effort to captivate audiences have announced their ambitions. The concept of FAV's has been around for over 8 decades (Haque, 2023), and while it was kept pretty quiet through the 20th century, as we move deeper into the 21st century, technology and innovation have been at the centre of everybody's mind. But while the fact that so many young drivers have heard of FAV's remains unsurprising, 15% of respondents claimed to have ridden in an FAV before. Typically considered a small number at 15%, this is a staggeringly large number of participants who have ridden in a

FAV, a vehicle which has not been fully released to the public just yet. Respondents who marked yes for riding in a FAV likely had the chance to experience Tesla's infant FAV technology which is more widely available to the public. These facts lead the study to mark experience as a moderator as a less significant component when contributing towards the attitudes of young drivers and FAV's. Their limited experience is thanks to the experimental status of FAVs on top of their already limited driving experience on the roads as opposed to their older segment counterparts.

The data stemming from the pillars was contained one noticeable outlier. Social Influence represented a unified front between young drivers. The average of young drivers' opinion on whether social influence would play a role on their purchase decision when it comes to FAV's was 1.68. The average shows that young drivers do not feel that social influence will sway them if they were to consider acquiring an FAV. This was a surprising find in a digital age where a large amount of the world's population partakes in social media which is a breeding ground for societal acceptance.

5.1.2 Results and previous studies

Respondents in this research paper did not react positively to performance expectancy. Young drivers overall disagreed that FAVs could provide performance benefits that an FAV could not. This includes factors like safety and driving ability. It revealed that young drivers still desired to take control of the vehicle they are driving. There is an inherent distrust towards FAV's and the idea of letting something other than a human take control of their life on the road. A study on tourists' willingness to operate a vehicle contained similar results. A part of their study, after conducting an online survey in Hungary, concluded that the importance of vehicle ownership and manual control of the vehicle negatively affects the perceived usefulness of FAV's. (Jászberényi et al., 2022) So, although halfway across the world, on a different content, and likely in different customer segments, from the two studies, humans were still able to agree that performance expectancy is not enough to convince them to set foot into an FAV.

Another previous study, that utilized the UTAUT model surveyed Europeans drivers of all ages, discovered from their respondents that 71.06% of them found automated

vehicles easy to use. (Nordhoff et al., 2020) This contradicted the respondents of this study who, on average, felt less positive about the effort expected to utilize an FAV. The respondents opinions were more spread apart with a an average of 2.45 on the five point scale. The respondents in the survey were asked if FAVs would be difficult to use. Respondents were not nearly as confident that FAVs would be perceived as easy to use. The study on Europeans included drivers of all ages and backgrounds as opposed to the young driver segment portrayed in this survey. The European respondents' increased experience on the road partly contributes to their confidence in being able to operate different kinds of vehicles on the roadway. These young respondents are the future consumers of the automobile market and have a long way to go to not only gain driving experience but also potentially witness the introduction of FAV's.

Finally, when young drivers were faced with determining their attitude towards FAV's when it came to price value, they agreed that they would only be willing to purchase an FAV if there were a special deal presented to them. Respondents answered above three at an average of 3.24. Price value is a unique pillar to the young driver customer segment because most do not have stable high-income jobs. Most drivers in this segment are still in school or just starting out, and do not have the same monetary status that older segments do. The average cost of an automobile in the United States as of February 2023 was $48,763. (Hailes 2023) For young drivers with typically lower salaries than their older counterparts, that price tag can be daunting. And so, drivers often opt for cheaper alternatives, often used. With FAV's being unintroduced, there are no used or cheaper options. Marketers will have to carefully think about the younger segment, and may even apply the same trim level strategy that was introduced nearly a century ago by GM. (Wedel & Kamakura, 2000)

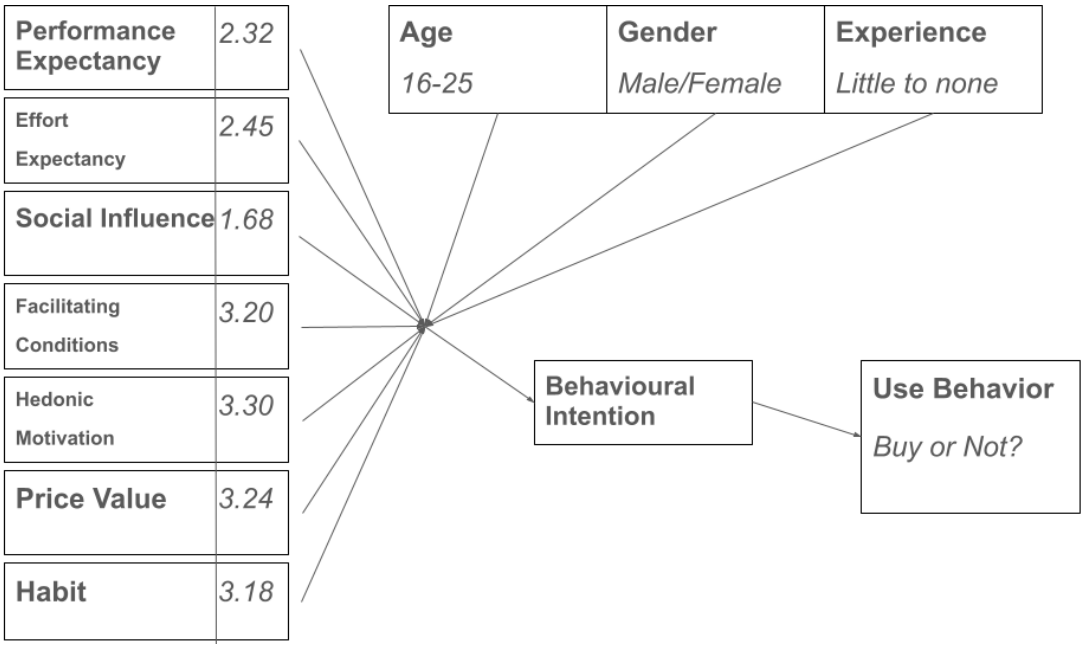

Figure 16: *Results in the UTAUT Model (2023)*

5.2 Discussion of method

When it came to the method in the study, there was a solid framework by which the paper was able to rely on to guide itself through the study. Discovering the quantitative variables that define young drivers in pertinence to customer segmentation was clearly stated as an ambitions of the study. The paper was working to uncover the true feelings of young drivers towards FAVs in hopes that marketers could better approach the young driver segment.

The drop off rate from the survey was 0%. The method of collecting data from respondents was effective in keeping the respondent's attention captivated and encouraging them to finish the survey. Respondents were briefed on the amount of time it took to complete the survey and successfully guided them to the end. The format of splitting the questions into the pillars created a streamlined process of collecting data from the survey. Combined with the funnel question method, the results clearly conveyed a message about the respondents and their feelings towards FAV's. With this transparently portrayed message, developing and perpetrating conclusions drawn from the results.

The study experienced some difficulties with applying the method when it came to developing the survey. It was imperative that all pillars of the UTAUT model were thoroughly covered in order to build an accurate picture of the young drivers' attitudes. Without it, the study would not have been able articulate valid information about the segment. And if this valid information were to be uncollected, the study would have been helpless in having the ability to give marketers an accurate idea of the segment that would be buying these FAV's. So, a dilemma stemmed from maintaining the brief nature of the survey to entice the younger audience, whilst still achieving proper thoroughness in order to create a necessary complexity for the study. The problem was solved by limiting each pillar, or section in the survey to 4 questions. These four questions, by law of the funnelling method, had to relate to each other and ultimately lead the respondent to answering the final question with the utmost sincerity.

In terms of research reliability, the study has full confidence that the research can be replicated and produce similar results. As long as the methods are followed the same as the study is carried out, the study meets a test- retest criteria, meaning a different researcher could replicate this research. (Dudovskiy, 2022) The study utilized the combination of previous research techniques to create a sort of research framework that the study could follow. By cantering the questions around the seven pillars from the UTAUT model, a new researcher can correctly probe their respondents. When developing the questions, if the researcher employs the funnel questioning method, they will achieve the utmost sincerity from their respondents. By containing the number of questions per pillar to around four questions, and utilizing the five-point scale, the respondents will be less likely to feel overwhelmed by length or excess options to choose from.

The same goes for validity. An outstanding limitation of this study is the unprobed waters it lies in. FAV's remain experimental technology not yet suitable for the public. And studies, such as this one, are only just coming out. The reliability of this study can testify to the validity that will soon be tested in the field. When placed against similar research papers, it should show that the results gathered from this research paper mirror that of outside studies. (Patino & Ferreira, 2018) The internal validity of this paper testifies to the consistency of results within the 86 valid respondents.

The validity of this study can be verified through the methods used to collect and analyse the results. Through the employment of the funnel questioning method and the seven pillars, the validity of the analysis was greatly boosted. The snowball method used was accurate in gaining a sizable sample of the population to analyse the results from. In leu of the efforts taken to ensure the validity of the study, certain methods can be improved upon to create an airtight valid study. The snowball method can be traded for a more thorough and vetted sample gathering process. It is very easy to lie online and fabricate answers. So, an in-person conduction of the survey could greatly reduce the chance for faulty answers. Furthermore, with such a large population of young drivers in Georgia (U.S. state), a larger sample size would be better suited to accurately portray the entire population.

For this particular study, the research method chosen prevailed as a useful and correct choice in investigating the desired group. A different method could possibly be used, such as an interview format, to gain a deeper, more intricate understanding of the customer base and their feelings towards FAV's. However, this different approach would produce results that represent the customer segment of young drivers in an entirely different way. The quantitative aspect of the study would be abandoned for an entirely qualitative approach.

6 CONCLUSIONS

In conclusion, this paper has examined the acceptance of fully autonomous vehicles (FAV's) among young drivers and its potential implications for customer segmentation. Utilizing the Unified Theory of Acceptance and Use of Technology (UTAUT) model, the study was able to establish valuable insights into the attitudes of young drivers towards FAV's. The study originally set out an aim to learn the attitudes of young drivers in Georgia (U.S. state) towards FAV's. This paper developed a research question that encapsulated this aim and drove the paper forward: What can marketers in the automobile industry expect from the young driver's customer segment when FAVs are introduced to the market? By answering this question and employing this information, the study hoped to get a better idea of what marketers can expect when the technology is released to the public. The findings of this study conclude that young

drivers exhibit more negative attitudes towards FAV's, as it pertains to the seven pillars and its moderators.

There were pillars that exhibited young drivers' willingness to try the technology and see its real world implications such as social influence and habit. When asked if social influence would sway their decision to purchase a vehicle, young drivers provided a resounding no, indicating that their decision to purchase one is affected by one less factor. A good sign for marketers in the future, who will not have to appeal to the societal influences that affect young drivers in order to encourage them to purchase. And with habit, although young drivers have developed firm habits in driving on their own, they are willing to ditch these habits in favour of experiencing FAV's. Another win for marketing strategists in the automobile industry. Habits are extremely hard to break in humans because they are developed over a long period of time. If young drivers are willing to go against these natures, then marketers will have an easier time persuading young audiences to consider purchasing an FAV.

But even with these positive takeaways, the majority of the pillars revealed that young drivers harboured negative attitudes towards the introduction of FAV's. Among the pillars that drove the denial of FAV's was the performance expectancy pillar. Young drivers did not perceive FAVs to offer any beneficial qualities as opposed to their regular driver operated counterparts. Young drivers agreed they would rather maintain in control of their own vehicle, than place their lives in the hands of a robot. In the future, this can be a point of attack for marketers, it can be used to focus on young drivers' fears of safety and performance expectancy and in turn craft marketing campaigns aimed to ease these worries.

These results have important implications for customer segmentation strategies in the automotive industry. Young drivers who are less accepting of FAV's may represent a challenging customer segment when it comes to the adoption of autonomous vehicles. Understanding their reservations and addressing their concerns through targeted marketing campaigns, educational programs, and improved technology features can be crucial for engaging this segment.

In conclusion, the lower acceptance of FAVs among young drivers poses challenges for the widespread adoption of autonomous vehicles in this customer segment. However, by acknowledging their concerns, addressing barriers, and proactively engaging with this group through targeted interventions, the automotive industry can get a jump on working towards bridging the gap between young drivers and their acceptance of FAV's. It is crucial to continue monitoring and studying the attitudes of young drivers towards FAV's, as their preferences and perceptions will play a significant role in shaping the future of autonomous transportation.

6.1 Limitations of the study

While this study took a comprehensive approach to unveiling young drivers' attitudes towards FAV's, and draw connections to their connotations in customer segmentation, there are several limitations to this research that should be acknowledged.

The first limitation this paper experienced is the sole focus on the UTAUT model and its pillars. On the one hand, the UTAUT model is the result of years of careful research and the combination of a plethora of behavioural models designed to better understand human attitudes. Alas, without feigning the importance of the factors in the model, there are still many other variables that have the potential of influencing young drivers' attitudes that were not covered in this study. Among them, cultural economic and even political factors can play important roles in influencing a young driver's attitude.

Secondly, the sample size may not be representative of the larger population of young drivers. The use of the snowball method, although effective in garnering a larger number of responses, still may inadvertently focus on a certain group of young drivers based on connections. The sample may have been limited to a specific geographic location in the state of Georgia (U.S. state), or even a specific demographic group. These factors may limit the ability of the findings to be generalized. Future studies with larger and more diverse samples could provide a more wholistic view of young drivers' attitudes towards FAV's.

Finally, the study relied on respondents self-reported measures of attitude and perception. Respondents may have provided answers that are more socially acceptable, even with the work of the funnel question method in effect. Future studies could use additional methods such as comprehensive observational data to provide more objective assessments of attitudes and behaviours.

Despite these limitations, the research paper has provided valuable insights into the attitudes of young drivers towards FAV's and the potential implications it holds for customer segmentation. The acknowledgment of these limitations opens the door for future research to provide an even greater understanding of the factors that influence autonomous vehicle acceptance, and further guide marketers to successful campaigns when addressing the young driver segment.

6.2 Suggestions for further studies

Future research is warranted to delve deeper into the underlying reasons for the lower acceptance among young drivers. Exploring additional factors such as trust, perceived ease of use, and cultural influences may provide a more comprehensive understanding of their attitudes towards FAV's. Additionally, studies that track the evolution of young drivers' attitudes and behaviours over time could shed light on the potential for changes in acceptance among young drivers as technology advances and public perceptions shift.

References

Al-Suqri, M.N., & Al-Kharusi, R.M. (2015). Ajzen and Fishbein's Theory of Reasoned Action (TRA) (1980).

Anderson, J. M. (2016). *Autonomous Vehicle Technology: A guide for policymakers*. RAND.

Cambridge Dictionary. (2023). *Consequence*. Cambridge Dictionary. Retrieved February 1, 2023, from https://dictionary.cambridge.org/dictionary/english/consequence

Carlier, M. (2021, August 4). *Number of licensed drivers in Georgia 2017*. Statista. Retrieved April 16, 2023, from https://www.statista.com/statistics/198080/number-of-licensed-drivers-in-georgia-in-2009/

Chan, Chu Chai Henry. (2007) Intelligent value-based customer segmentation method for campaign management: A case study of automobile retailer, Expert Systems with Applications, Volume 34, Issue 4, 2008, Pages 2754-2762, ISSN 0957-4174, https://doi.org/10.1016/j.eswa.2007.05.043. (https://www.sciencedirect.com/science/article/pii/S0957417407001686)

Chuttur, Mohammad. (2009). Overview of the Technology Acceptance Model: Origins, Developments and Future Directions. Sprouts: Working Papers on Information Systems. 9.

Coe, Robert et al. Research Methods and Methodologies in Education. 2nd ed. SAGE Publications, 2017. Web. 31 Mar. 2023.

Cole, R. (2023, May 4). *Autonomous Vehicle*. Encyclopædia Britannica. https://www.britannica.com/technology/autonomous-vehicle

Das, M. (2021, September 29). *Customer segmentation: Definition, importance, types, and best practices*. LinkedIn. Retrieved February 7, 2023, from https://www.linkedin.com/pulse/customer-segmentation-definition-importance-types-best-munmun-das/

Dudovskiy, J. (2022). Research reliability - research-methodology. Research. Retrieved March 31, 2023, from https://research-methodology.net/research-methodology/reliability-validity-and-repeatability/research-reliability/

Encyclopædia Britannica, inc. (2023). *Technology*. Encyclopædia Britannica. Retrieved February 1, 2023, from https://www.britannica.com/technology/technology

Fullerton, Ronald A. (1985) ,"Segmentation Strategies and Practices in the 19Th-Century German Book Trade: a Case Study in the Development of a Major Marketing Technique", in SV - Historical Perspective in Consumer Research: National and International Perspectives, eds. Jagdish N. Sheth and Chin Tiong Tan, Singapore : Association for Consumer Research, Pages: 135-139.

Gadekar, M. (2016) "Significance of Market Segmentation," in *Lessons in Market Segmentation, Brand Management, and Consumer Behavior*. Beau Bassin, Mauritius: LAP LAMBERT Academic Publishing, pp. 7–12.

Georgia.gov. (2023). *Apply for a georgia provisional driver's license (class D)*. Georgia.gov. Retrieved March 1, 2023, from https://georgia.gov/apply-georgia-provisional-drivers-license-class-d

Goyal, K. A., & Sadasivam, A. (2010). A critical analysis of rational & emotional approaches in car selling. International Journal of Business Research and Management (IJBRM), 1(2), 59-63.

Group, M.-B. (2023). *Benz Patent Motor Car: The first automobile (1885–1886): Mercedes-Benz Group*. Mercedes. Retrieved February 1, 2023, from https://group.mercedes-benz.com/company/tradition/company-history/1885-1886.html

Hailes, D. (2023, March 8). *New-vehicle transaction prices trend downward as incentives rise, according to Kelley Blue Book*. Cox Automotive Inc. Retrieved April 16, 2023, from https://www.coxautoinc.com/market-insights/kbb-atp-february-2023/

Hasan, Omar & Mccoll, Julie & Pfefferkorn, Tom & Hamadneh, Samer & Alshurideh, Muhammad & Al Kurdi, Barween. (2022). Consumer attitudes towards the use of autonomous vehicles: Evidence from United Kingdom taxi services. International Journal of Data and Network Science. 6. 537–550. 10.5267/j.ijdns.2021.11.010.

Haque, N. (2023, January 16). *Development history and future of Self Driving Autonomous Cars*. Tech Inspection. Retrieved February 7, 2023, from https://techinspection.net/development-history-and-future-of-self-driving-autonomous-cars/

Hoskins, P. (2022) *Domino's: Fast Food Giant pulls out of Italy, the home of pizza, BBC News*. BBC. Available at: https://www.bbc.com/news/business-62487788 (Accessed: March 31, 2023).

Jászberényi, Melinda, Miskolczi, Mark, Munkácsy, András, Földes, Dávid. (2022). What drives tourists to adopt self-driving cars?, Transportation Research Part F: Traffic Psychology and Behaviour, Volume 89, 2022, Pages 407-422, ISSN 1369-8478, https://doi.org/10.1016/j.trf.2022.07.013. (https://www.sciencedirect.com/science/article/pii/S1369847822001632)

Joung, Junegak & Kim, Harrison. (2023). Interpretable machine learning-based approach for customer segmentation for new product development from online product reviews, International Journal of Information Management, Volume 70, 2023, 102641, ISSN 0268-4012, https://doi.org/10.1016/j.ijinfomgt.2023.102641. (https://www.sciencedirect.com/science/article/pii/S0268401223000221)

Kulviwat, Songpol & Bruner, Gordon & Kumar, Anand & Altobello, Suzanne & Clark, Terry. (2007). Toward a unified theory of consumer acceptance technology. Psychology & Marketing - PSYCHOL MARKET. 24. 1059-1084. 10.1002/mar.20196.

Kuttimani Tamilmani, Nripendra P. Rana, Samuel Fosso Wamba, Rohita Dwivedi. (2020). The extended Unified Theory of Acceptance and Use of Technology (UTAUT2): A systematic literature review and theory evaluation, International Journal of Information Management, Volume 57, 2021, 102269, ISSN 0268-4012, https://doi.org/10.1016/j.ijinfomgt.2020.102269. (https://www.sciencedirect.com/science/article/pii/S0268401220314687)

LaMorte, W. W. (2022, November 3). *Behavioral change models*. The Theory of Planned Behavior. Retrieved March 1, 2023, from https://sphweb.bumc.bu.edu/otlt/mph-modules/sb/behavioralchangetheories/BehavioralChangeTheories3.html

Manktelow, J., & Carlson, A. (2022, October 4). *Questioning Techniques*. Root Cause Analysis Toolkit - MN Dept. of Health. Retrieved April 24, 2023, from https://www.health.state.mn.us/facilities/patientsafety/adverseevents/toolkit/index.html

Marikyan, D. & Papagiannidis, S. (2022) Technology Acceptance Model: A review. In S. Papagiannidis (Ed), TheoryHub Book. http://open.ncl.ac.uk

Mcleod, S. (2023, March 8). *Likert scale definition, examples and analysis*. Likert Scale Definitions, Examples, and Analysis. https://www.simplypsychology.org/likert-scale.html

Milden, P. (2022) *Ethics for Students.* https://arcada.itslearning.com/LearningToolElement/ViewLearningToolElement.aspx?LearningToolElementId=423262

Molnar, Andreea & Weerakkody, Vishanth & El-Haddadeh, Ramzi & Lee, Habin & Irani, Zahir. (2013). A Framework of Reference for Evaluating User Experience When Using High Definition Video to Video to Facilitate Public Services. 402. 10.1007/978-3-642-38862-0_27.

National Highway Traffic Safety Administration. (2020). *2020 data: Young Drivers - Transportation*. Traffic Safety Facts. Retrieved March 1, 2023, from https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813313

Nordhoff, Sina, & Louw, Tyron, & Innamaa, Satu, & Lehtonen, Esko & Beuster, Anja, & Torrao, Guilhermina, & Bjorvatn, Afsaneh, & Kessel, Tanja, & Malin, Fanny, & Happee, Riender, & Merat, Natasha. (2020). Using the UTAUT2 model to explain public acceptance of conditionally automated (L3) cars: A questionnaire study among 9,118 car drivers from eight European countries, Transportation Research Part F: Traffic Psychology and Behaviour, Volume 74, 2020, Pages 280-297, ISSN 1369-8478, https://doi.org/10.1016/j.trf.2020.07.015. (https://www.sciencedirect.com/science/article/pii/S1369847820304824)

Patino, C. M., & Ferreira, J. C. (2018). Internal and external validity: can you apply research study results to your patients?. Jornal brasileiro de pneumologia : publicacao oficial da Sociedade Brasileira de Pneumologia e Tisilogia, 44(3), 183. https://doi.org/10.1590/S1806-37562018000000164

Plananska, Jana & Gamma, Karoline. (2021). Product bundling for accelerating electric vehicle adoption: A mixed-method empirical analysis of Swiss customers, Renewable and Sustainable Energy Reviews, Volume 154, 2022, 111760, ISSN 1364-0321, https://doi.org/10.1016/j.rser.2021.111760. (https://www.sciencedirect.com/science/article/pii/S1364032121010303)

Rejali, Sina, & Aghabayk, Kayvan, & Esmaeli, Saeed, & Shiwakoti, Nirajan. (2022). Comparison of technology acceptance model, theory of planned behavior, and unified theory of acceptance and use of technology to assess a priori acceptance of fully automated vehicles, Transportation Research Part A: Policy and Practice, Volume 168, 2023, 103565, ISSN 0965-8564, https://doi.org/10.1016/j.tra.2022.103565. (https://www.sciencedirect.com/science/article/pii/S0965856422003160)

Tesla. (2023). *Autopilot and full self-driving capability: Tesla Support Other Europe*. Tesla. Retrieved February 7, 2023, from https://www.tesla.com/en_eu/support/autopilot

Venkatesh, V. (2003). *The Unified theory of Acceptance and Use of Technology* [Model] Available from: https://www.researchgate.net/figure/The-research-model-UTAUT-

Venkatesh-et-al-2003-The-UTAUT-model-uses-four-core_fig1_283503814 [accessed 30 Mar, 2023]

Venkatesh, V. (2012). *The Unified theory of Acceptance and Use of Technology 2* [Model] Available from: https://www.researchgate.net/figure/UTAUT2-Venkatesh-et-al-2012_fig2_261705281 [accessed 30 Mar, 2023]

Wedel, Michel & Kamakura, Wagner. (2000). The Historical Development of the Market Segmentation Concept. 10.1007/978-1-4615-4651-1_1.

Yuen, K. F., Chua, G., Wang, X., Ma, F., & Li, K. X. (2020). Understanding Public Acceptance of Autonomous Vehicles Using the Theory of Planned Behaviour. International journal of environmental research and public health, 17(12), 4419. https://doi.org/10.3390/ijerph17124419

Appendices 1

SURVEY QUESTIONS

A survey on young driver's consumer attitudes towards Fully Automated Vehicles.

This survey is being conducted as part of a bachelor's thesis. Participation in this survey is fully voluntary and not required by any participant. All personal information is fully confidential and will not be stored or presented in the final paper. A participant is allowed to rescind their participation from the study at any time by requesting the researcher. The survey is anonymous and no sensitive information will be stored or presented. All information is exclusively handled by the researcher and will not be distributed to outside sources.

* Indicates required question

This quiz is 30 questions.
It takes between 3-5 minutes to complete.

1. Age *

2. Years of driving experience*

Mark only one oval.

Less than a year
1-5 years
5+ years

3. State of Residence*

Mark only one oval.

Georgia
Other:

4. Gender*

Mark only one oval.

Male
Female
Other
Prefer not to say

5. Do you know what a Fully Automated Vehicle (FAV) is?*

Mark only one oval.

Yes
No
Maybe

Fully Automated Vehicle (FAV)

A fully automated vehicle is a car that can operate completely on its own accord on public roads. No input from the driver is needed to operate the vehicle. It can signal, turn, accelerate, and stop on its own. Emergency operations are also carried out by the car. The passengers are simply passengers.

6. Have you ever ridden in a FAV?*

Mark only one oval.

Yes
No
Maybe

Performance Expectancy

7. I would buy a regular vehicle without considering its performance abilities (i.e. speed, braking, reliability)*

Mark only one oval.

Strongly Disagree
1
2
3
4
5
Strongly Agree

8. Using a FAV would be better than using a regular vehicle.*

Mark only one oval.

Strongly Disagree
1
2
3
4
5
Strongly Agree

9. I am willing to put my life in the hands of a FAV.*

Mark only one oval.

Strongly Disagree
1
2
3
4

5
Strongly Agree

10. Using a FAV will increase my quality of life.*

Mark only one oval.

Strongly Disagree
1
2
3
4
5
Strongly Agree

Effort Expectancy

11. Using a FAV is a daunting task to me.*

Mark only one oval.

Strongly Disagree
1
2
3
4
5
Strongly Agree

12. Using a FAV would be easy for me.*

Mark only one oval.

Strongly Disagree
1
2
3
4
5
Strongly Agree

13. Using a FAV would be easier than using a regular vehicle.*

Mark only one oval.

Strongly Disagree
1
2
3
4
5

Strongly Agree

14. Using a FAV seems extremely complicated.*

Mark only one oval.

Strongly Disagree
1
2
3
4
5
Strongly Agree

Social Influence

15. I would use a FAV if my friends had one.*

Mark only one oval.

Strongly Disagree
1
2
3
4
5
Strongly Agree

16. I would buy a FAV if it were "cool" to have one.*

Mark only one oval.

Strongly Disagree
1
2
3
4
5
Strongly Agree

17. I would not buy a FAV if I could get "cancelled" for having one.*

Mark only one oval.

Strongly Disagree
1
2
3
4
5
Strongly Agree

18. I am worried what people would think of me if I owned a FAV.*

Mark only one oval.

Strongly Disagree
1
2
3
4
5
Strongly Agree

Facilitating Conditions

19. I think a FAV would be easier to own than a regular vehicle.*

Mark only one oval.

Strongly Disagree
1
2
3
4
5
Strongly Agree

20. I would not buy a FAV if I had to accommodate it.*

Mark only one oval.

Strongly Disagree
1
2
3
4
5
Strongly Agree

21. I have the resources to own a FAV.*

Mark only one oval.

Strongly Disagree
1
2
3
4
5
Strongly Agree

22. I have resources to help me if I don't know how to use a FAV.*

Mark only one oval.

Strongly Disagree
1
2
3
4
5
Strongly Agree

Hedonic Motivation

23. I am worried that purchasing an FAV would not be fun.*

Mark only one oval.

Strongly Disagree
1
2
3
4
5
Strongly Agree

24. Using regular vehicles would be more fun than FAV's.*

Mark only one oval.

Strongly Disagree
1
2
3
4
5
Strongly Agree

25. Using a FAV would be entertaining.*

Mark only one oval.

Strongly Disagree
1
2
3
4
5
Strongly Agree

Price Value

26. I am worried that purchasing an FAV would be too expensive.*

Mark only one oval.

Strongly Disagree
1
2
3
4
5
Strongly Agree

27. I think FAV's will be reasonably priced.*

Mark only one oval.

Strongly Disagree
1
2
3
4
5
Strongly Agree

28. I would pay more for a FAV than a regular car.*

Mark only one oval.

Strongly Disagree
1
2
3
4
5
Strongly Agree

29. I would buy an FAV, only if I got a special deal.*

Mark only one oval.

Strongly Disagree
1
2
3
4
5
Strongly Agree

Habit

30. The use of a regular vehicle has become a habit for me.*

Mark only one oval.

Strongly Disagree
1
2
3
4
5
Strongly Agree

31. I must use a regular vehicle. *

Mark only one oval.

Strongly Disagree
1
2
3
4
5
Strongly Agree

32. I am open to using a FAV.*

Mark only one oval.

Strongly Disagree
1
2
3
4
5
Strongly Agree