

Master's Thesis U.S.E.

An Investigation into the Key Factors Influencing the Customer Usage of Urban Air Mobility
Services

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Abstract

The research entails the investigation of the key factors influencing the “customer usage of UAM services”. The research question is, “To what extent are key factors influencing the customer usage of UAM services?”. The question is related to an emerging market for UAM services and how different factors influence the usage of these services, including the reasons for this, how they influence each other, and the extent of the influence. The research is approached through collecting secondary data on UAM service adoption and service quality as part of an in-depth case study, where primary data is collected using interviews and analyzed with an adjusted grounded theory approach. The main findings indicate that “access” is the most important factor and “courtesy” is the least important factor, when representing their related “UAM service adoption” factors. This means that “access” should be of utmost importance when developing these services in order to boost service usage.

1. Introduction

Society has experienced a vast number of developments in the past 100 years, but a major development has been the colossal growth of the world's total population (Roser et al. 2013). This immense increase has contributed to a number of issues that are becoming increasingly problematic, where there are three major issues to be concerned about. To begin with, traffic congestion has soared, and this has contributed to noise pollution, traffic delays and safety risks that currently face global transportation systems. The second problem is traffic safety. The number of global ground vehicles has significantly increased in the past three decades, which has produced a greater chance for accidents and collisions to occur. Lastly, the third major problem is the climate crisis, where there is a high need to innovate current modes of transportation in order to tackle the crisis.

As can be seen, there are severe issues facing our world today. Therefore, this research relates to an emerging market for urban air mobility services (UAM), where these services have the potential to reduce the aforementioned problems. UAM markets are currently in the prototype stage of development, where multiple businesses are involved. For example, in 2019, Boeing partnered up with Porsche to develop an electric vertical take-off and landing aircraft (Lambert, 2019). Furthermore, Uber and Hyundai have been working together since 2020 to also develop a similar aircraft (Lambert, 2020). Recent start-ups, such as "Jetoptera" and "Volocopter", have also started developing UAM vehicle designs that are all-electric (Delbert, 2021). Overall, the emerging UAM market is still in development and has a way to go until it has reached full maturation and mainstream adoption.

For this research paper, literature on the adoption of UAM services consists of studies done by Al Haddad et al. (2020) and Chaniotakis et al. (2020) in order to determine the factors influencing the adoption of these services. Furthermore, research has been conducted by Booz et al. (2018) to investigate the societal barriers facing UAM services, Deloitte (2019) to investigate consumer perceptions on UAM services, Straubinger et al. (2020) to produce an overview of current UAM research and developments, Garrow et al. (2021) to perform a comparative analysis between UAM and autonomous/electric ground transportation, and Fu et al. (2019) to explore the preferences for different transportation modes in an UAM environment. Therefore, the research of this paper aims to answer the following core question, "To what extent are key factors influencing the customer usage of UAM services?".

Moreover, this research focuses on the literature gaps in relation to the "contemporary relationships" and "nature of association" surrounding the key factors influencing the "customer usage of UAM services". Current literature does not investigate the influence that factors have between each other, and how those associations influence the adoption of UAM services. Furthermore, there is a need to update existing research since it is currently 2022 and customer perceptions have changed, where the latest literature on the adoption of UAM services only goes until 2021.

Logical sub-questions for the research question are, "What are the reasons for key factors influencing UAM service usage?" and "How do these key factors influence each other?". The main results of this paper indicate that the majority of people value access, competence, ease of use, accessibility, availability and time savings as key factors when deciding to use UAM services, where the credibility and reputation of the service is also highly important. Overall, this research paper is structured by starting with a theoretical framework/literature review, followed by the empirical strategy used to answer the research question, then the results and their interpretation, then the discussion of the results in relation to the collected literature, and ultimately ending with a conclusion for this research.

2. Theoretical Framework & Literature Review

When examining the literature relevant to the research question, the theories and studies surrounding the adoption of UAM services, and the role of service quality come into question. Furthermore, the literature assists in the construction of a theoretical framework. The framework is used to assess and compare, through the qualitative research of this paper, the identified key factors influencing the “customer usage of UAM services”. Specifically, these factors are service characteristics that are being investigated, as determinants of “UAM service adoption” and “perceived service quality”, in relation to their varying positive or negative relationships with the “customer usage of UAM services”. Therefore, factors function as promoters (positive) or barriers (negative), where a positive or negative relationship determines whether a factor supports or lacks support for the “customer usage of UAM services”.

To begin with, the literature surrounding the adoption of UAM services stems from Al Haddad et al. (2020) and Chaniotakis et al. (2020) who identified the key factors, influencing UAM service adoption, using fundamental adoption theories, such as the Technology Acceptance Model (TAM) and the Automation Acceptance Model (AAM). “UAM service adoption”, and the key positive and negative factors influencing it, acts as the primary dimension of customer usage to investigate in relation to either supporting or not supporting the “customer usage of UAM services”. Furthermore, various UAM related studies, focusing on the key factors influencing the “customer usage of UAM services”, are used to support the literature on the adoption of UAM services.

The theory for service quality consists of a service quality model called SERVQUAL. The model outlines the key factors influencing consumers’ evaluation of “perceived service quality”, which ultimately has an impact on whether a customer will find it attractive to use a service or not (Parasuraman et al., 1985). “Perceived service quality”, and the key positive and negative factors influencing it, acts as the supplementary dimension of customer usage to investigate in relation to the aforementioned primary dimension.

Overall, the theoretical framework of this paper makes use of a literature review that is integrated within the framework. Initially, the relevant literature and their methodologies are elaborated upon, followed by a constructed theoretical framework that links the literature to the research question using supportive evidence from the literature’s main findings, and concluding with an identification of the gaps and limitations from the literature. Furthermore, not every component of the collected literature is relevant to this research. Therefore, only relevant components are elaborated upon and used to formulate expected relationships.

2.1. Adoption of UAM Services

2.1.1. TAM, AAM, & UAM Service Adoption

In 2020, Al Haddad et al. (2020) conducted quantitative research, using stated-preference surveys, to assess user perceptions in relation to the adoption time horizon. The study analysed the results through an exploratory factor analysis that quantified the factors influencing the adoption of UAM services. The identified key factors, relevant to this research, were safety, trust, data concerns, value of time savings, automation costs and service reliability. The study built a model that combined TAM and AAM to determine behavioural intention from the key factors. Furthermore, Chaniotakis et al. (2020) collaborated with Al Haddad et al. (2020) and identified that these key factors were significantly related to customer satisfaction. They also identified accessibility, crowding, comfort, and cost savings as key factors. Overall, they determined that these factors are also linked to customer satisfaction, which heavily influences the adoption of UAM services.

TAM and AAM are now elaborated upon in order to provide clarification on the theories used by Al Haddad et al. (2020) and Chaniotakis et al. (2020) to identify the key factors influencing UAM service adoption. TAM, constructed by Fred Davis in 1989, builds upon Ajzen and Fishbein's theory of reasoned action (TRA), where TRA proposes that attitudes about the expectations and social norms surrounding a behaviour influence an individual's ultimate behaviour (Straub, 2009). Furthermore, Davis made use of multi-item measurement scales for his theoretical constructs and analysed them through two empirical studies dealing with correlation and regression analyses (Davis, 1989). Davis concluded that the ultimate use of an innovation could be determined by two perceived characteristics surrounding an innovation. The first characteristic, the perceived ease-of-use, relates to the extent that an individual believes an innovation is effortless to use. The second characteristic, perceived usefulness, refers to the extent that an individual believes an innovation will improve their job performance by using it (Davis, 1989). Furthermore, Davis stated that perceived usefulness is a consistent determinant of future technology use. As for AAM, this is an extension of TAM that was proposed by Ghazizadeh et al. (2011) to assess automation acceptance. It uses "task-technology compatibility" and "past experience" as constructs to explain "human-automation interaction" and its role in the adoption of automation technologies. In the following section, an overview of UAM related studies is provided in order to expand upon the identified key factors influencing the "customer usage of UAM services".

2.1.2. UAM Service Studies

To begin with, a market study using self-reported surveys and focus groups, conducted by Booz et al. (2018) for NASA, revealed several societal barriers that face urban air mobility in our present-day. These societal barriers represent key customer perceptions that already exist surrounding air-vehicles, such as ones that may be piloted, autonomous, sustainable or another alternative. The study found that trust in automation/aviation systems, automation based on branding, pilots, air traffic controllers and a willingness to fly were key factors influencing an individual's decision-making in relation to air-taxi services. The focus groups revealed that public perceptions of autonomous aircrafts played a vital role in acting as a barrier. Furthermore, the cost as a mode of transportation, personal security and the preference for short inter-regional trips using UAM are other perceptions that play a key role in customer decision-making.

Another study, conducted by Deloitte in 2019, made use of global consumer surveys for more than 35,000 consumers in 20 different countries, where the surveys revealed that 49% of United States respondents were unconvinced about air-taxi safety while 39% percent were unconvinced in China. Overall, 48% of respondents were unconvinced in 2019, compared to 46% in 2018 (Deloitte, 2019). Furthermore, Gen Y and Gen Z respondents came to a consensus that urban air mobility is an efficient alternative mode of transportation. However, Gen Y and Gen Z were more cautious about the safety of these services than other respondents. This is important because these two generations will be the next largest and main consumer generations.

Straubinger et al. (2020) produced an overview of current UAM research and developments in order to provide a collection of relevant topics concerning the implementation of UAM services. This was done by gathering insights and research from several UAM research fields such as vehicle-related aspects, operational concepts, and potential barriers towards UAM service introduction. The overview identified that the vehicle-related factors that are of major importance to consumers are the noise emissions, size/dimensions, range, seat capacity and cruise speed. The identified operational factors were ease of use/autonomy, safety/reliability, community friendly, environmentally friendly, affordable, door-to-door, and

on-demand mobility (Hansman & Vascik, 2016). The overview also identified potential barriers, where consumers' concerns lie with the safety of people on the ground, type and level of noise emitted by UAM vehicles, and time of day and altitude that UAM vehicles travel at (Yedavalli & Mooberry, 2016). It can be seen that UAM services that focus on reducing the impact they might have on non-users contributes to increasing customers' willingness to accept these services.

Garrow et al. (2021) carried out a comparative analysis between UAM and autonomous/electric ground transportation. This was done by conducting a meta-analysis on around 800 articles related to, and spread across, UAM, electric ground vehicles (EV), and autonomous ground vehicles (AV). Furthermore, these articles were published between 2015 and 2020. The analysis identified that trust, environmental awareness, ease of use, and usefulness are key positive factors that promote UAM acceptance. On the other hand, perceived risk is a barrier towards UAM adoption because of the concern it generates within customers in relation to their safety and time. In addition, the value of time, in relation to the opportunity costs of the time it takes to travel, is paramount to consumers. Furthermore, the willingness to share UAM trips with strangers is another key factor that consumers take into consideration, where comfort and security are involved here.

Lastly, a case study, focused on the German city of Munich, was conducted by Fu et al. (2019) in order to explore the preferences for transportation modes in an UAM environment. The study used a stated preference survey that included a stated choice experiment, where a main mode choice multinomial logit model and various sub-models were developed in relation to four modes of transportation. These modes were autonomous flying taxi, autonomous taxi, private car, and public transportation. The study identified that respondents valued travel time, safety level, availability, convenience, trip purpose and travel cost as key factors in their decision-making. Furthermore, higher income and value of time influence the importance of these key factors, thus revealing the need for UAM services to consider the varying importance of each factor.

2.2. Service Quality

Upon examining the literature surrounding the adoption of UAM services, it can be seen that the key factors influencing the "customer usage of UAM services" are investigated in great depth. However, in order to tackle the research question, "To what extent are key factors influencing the customer usage of UAM services?", there also needs to be an investigation into the influences that factors have between each other. Specifically, there needs to be an investigation into the "nature of association" surrounding the identified key factors. Evidently, there are a wide range of key factors, which extends the research of this paper beyond the realms of feasibility. Therefore, the collected literature on service quality allows for "UAM service adoption" factors to be incorporated into succinct "perceived service quality" factors that can be efficiently and feasibly investigated and compared. Furthermore, "perceived service quality", as a dimension of customer usage, has the ability to be applied to UAM services since it involves understanding the key factors influencing an individual's decision to use a service. As for how the factors relate to each other, between the two dimensions of customer usage, that is elaborated upon in the theoretical framework of this paper.

Therefore, in order to understand the key factors influencing an individual's decision to use a service, we must examine the service quality model, SERVQUAL, constructed by Parasuraman et al. (1985). The model and its scale were developed using a qualitative approach, consisting of in-depth executive interviews and consumer focus groups. The

interviews and focus groups were conducted with companies from four service categories: retail banking, credit card, securities brokerage, and product repair and maintenance.

The multi-item scale SERVQUAL model assesses customer perceptions of service quality and outlines ten key determinants of service quality consisting of: access, communication, competence, courtesy, credibility, reliability, responsiveness, security, tangibles, and understanding/knowing the customer (Parasuraman et al., 1985). These determinants were shown to influence “perceived service quality”, which is explained in the theoretical framework of this paper. To begin with, access refers to approachability and ease of contact. Communication refers to the degree that the service effectively informs customers and maintains relationships. Competence refers to the ability to perform a service. Courtesy refers to the degree of hospitality from service personnel. Credibility refers to the degree of trustworthiness in the service. Reliability refers to the degree of consistency and dependability. Responsiveness refers to the willingness of the service to be ready to assist when necessary. Security refers to the degree of safety from danger or risk. Tangibles refer to the services’ physical evidence. Finally, understanding/knowing the customer refers to the degree of effort that the service puts in to understand the needs of customers.

2.3. UAM Services & the Theoretical Framework for Investigating Customer Usage

As was revealed in the previous sections, there are multiple factors that influence the “customer usage of UAM services”. However, a link needs to be made between the literature and the research question to construct a theoretical framework that can be used effectively throughout the research. This is done to develop theoretical expected relationships for the key factors influencing the “customer usage of UAM services”. It is important to note that throughout the literature there are factors that overlap, where different pieces of literature have identified similar factors. In addition, some factors can function as both promoters and barriers depending on the context. Furthermore, the literature reveals that the factors fall under distinct categories of service characteristics, such as the service operations or vehicle design, where some factors can be applied to multiple categories of service characteristics. Therefore, expected relationships are formulated on the basis of this, where a figure is provided for visualization and clarification.

2.3.1. UAM Service Adoption as a Dimension of Customer Usage of UAM Services

To begin with, Al Haddad et al. (2020) and Chaniotakis et al. (2020) identified the key factors of safety, trust, data concerns, value of time savings, automation costs, service reliability, accessibility, crowding, comfort, and cost savings. They found that safety, trust, value of time savings, service reliability, accessibility, comfort, and cost savings have positive relationships with UAM service usage while data concerns, automation costs and crowding have negative relationships. Furthermore, customer satisfaction was boosted by the positive factors, thus supporting service usage. Therefore, an expected relationship can be formulated as follows: *“Safety, trust, value of time savings, service reliability, accessibility, comfort, and cost savings promote UAM service usage by boosting customer satisfaction. In contrast, data concerns, automation costs and crowding are barriers to UAM service usage.”*

Booz et al. (2018) identified key societal barriers that are based on customer perceptions related to the trust in vehicle designs and service operations, willingness to fly, cost, personal security, and trip preference. The study determined that public perceptions are overall negative or traditional on these key barriers due to a general lack of trust in new forms of flight, such as autonomous or sustainable air-vehicles. This simultaneously reduces the willingness to fly. Furthermore, the cost concerns, personal security concerns and varying trip preferences have negatively contributed to UAM service perceptions. Therefore, an expected relationship can be

formulated as follows: *“Lack of trust in operations, cost concerns, personal security concerns and varying trip preferences are barriers to UAM service usage by reducing the willingness to fly.”*

Deloitte (2019) identified safety and efficiency as the two key factors influencing UAM service usage. The surveys from the study revealed a divided public opinion on the safety of UAM, while Gen Y and Z held more favourable perceptions on the efficiency of UAM as alternative transport. Therefore, an expected relationship can be formulated as follows: *“Efficiency promotes UAM service usage by generating favourable customer perceptions. In contrast, lack of perceived safety is a barrier to UAM service usage by generating unfavourable customer perceptions on service legitimacy.”*

Straubinger et al. (2020) identified the following key vehicle-related factors: noise emissions, size/dimensions, range, seat capacity and cruise speed. They found that these factors negatively influence UAM service usage. This is due to customer concerns surrounding the ability of UAM services to integrate all these factors in a manner that maintains low noise emissions while still being able to offer comfortable vehicle interior spacing and optimal speed and range. For example, larger vehicles will require larger motors but will produce more noise, thus revealing unsatisfactory trade-offs that can only be minimized through future innovations. The identified operational factors are ease of use/autonomy, safety/reliability, community friendly, environmentally friendly, affordable, door-to-door, and on-demand mobility. They found that these factors have positive relationships with UAM service usage because of the personal and societal benefits they offer to customers. It was also identified that the safety of people on the ground, type and level of noise emitted by UAM vehicles, and time of day and altitude that UAM vehicles travel at are all key factors that negatively influence UAM service usage due to customer concerns. Therefore, an expected relationship can be formulated as follows: *“Ease of use/autonomy, safety/reliability, community friendly, environmentally friendly, affordable, door-to-door, and on-demand mobility promote UAM service usage. In contrast, noise emissions, size/dimensions, range, seat capacity, cruise speed, the safety of people on the ground, type and level of noise emitted by UAM vehicles, and time of day and altitude that UAM vehicles travel at are barriers to UAM service usage.”*

Garrow et al. (2021) identified multiple factors and their relationships with UAM service usage. Using the findings of the comparative analysis, as previously mentioned in the literature review, an expected relationship can be formulated as follows: *“Trust, environmental awareness, ease of use, usefulness, and value of time promote UAM service usage. In contrast, perceived risk, and willingness to share UAM trips with strangers are barriers to UAM service usage due to customer concerns.”*

Finally, Fu et al. (2019) identified that customers place importance on travel time, safety level, availability, convenience, trip purpose and travel cost. They found that travel time, safety level, trip purpose and travel cost negatively influence a customer’s decision to use a mode of transportation. On the other hand, availability and convenience were shown to have positive relationships with decision-making and service usage. These findings are based on the level of utility that respondents exhibited in relation to these key factors, where higher utility expresses greater importance of a factor to a respondent and lower utility expresses lesser importance. Therefore, an expected relationship can be formulated as follows: *“Availability and convenience promote UAM service usage while travel time, safety level, trip purpose and travel cost are barriers to UAM service usage.”*

2.3.2. Perceived Service Quality as a Dimension of Customer Usage of UAM Services

The SERVQUAL model identified the following key factors in relation to “perceived service quality”: access, communication, competence, courtesy, credibility, reliability, responsiveness, security, tangibles, and understanding/knowing the customer. Parasuraman et al. (1985) concluded that these factors can act as promoters or barriers to service usage, depending on the context and angle of the factors being perceived by customers. Therefore, an expected relationship can be formulated as follows: *“Access, communication, competence, courtesy, credibility, reliability, responsiveness, security, tangibles, and understanding/knowing the customer promote or act as barriers to UAM service usage by impacting the “perceived service quality” held by customers.”*

2.3.3. Visualization of Theoretical Framework

In this section, a figure visualizing all of the key factors identified in the literature, as promoters or barriers, is presented in order to provide a clear view of the constructed theoretical framework that is used to qualitatively assess and compare the key factors influencing the “customer usage of UAM services”. It is important to take into consideration that similar factors are grouped together and that factors are categorized with respect to their designated service characteristic, where factors are derived from the two dimensions of customer usage, which are “UAM service adoption” and “perceived service quality”.

As mentioned earlier, the “perceived service quality” factors are highly related to the “UAM service adoption” factors. This is because the “UAM service adoption” factors can essentially act as different elements of the “perceived service quality” factors. Therefore, “perceived service quality” factors are used in this research to represent the “UAM service adoption” factors in a clear and concise manner, where “UAM service adoption” factors are still relevantly investigated. Furthermore, only five factors from “perceived service quality” are used to represent the “UAM service adoption” factors since they possess the greatest similarities, which reveals that these five factors are more important to prioritize and investigate than the other five factors from “perceived service quality”. The five factors of importance consist of access, credibility, security, competence, and courtesy. To be clear, the “UAM service adoption” factors related to “access” are connected because they all possess a degree of approachability and ease of contact. The factors connected to “credibility” all relate to the trustworthiness in the service. The factors connected to “security” all relate to the degree of safety from danger or risk. The factors connected to “competence” all relate to the ability to perform a service. Finally, the factors connected to “courtesy” all relate to the degree of hospitality. As a side note, the promoters and barriers exhibited in the constructed theoretical framework are also conveying theoretical support or a theoretical lack of support for the “customer usage of UAM services” due to the nature of promoters and barriers, as factors that either assist or impede. Below is the table that exhibits the constructed theoretical framework derived from the literature:

Table 1: Constructed Theoretical Framework

Service Characteristic	Dimensions of Customer Usage & their Related Key Factors		
	<i>UAM Service Adoption</i>		<i>Perceived Service Quality</i>
	Promoters	Barriers	Promoters/Barriers
Operational Factors	Accessibility, Ease of Use/Autonomy, Affordable, Cost of Savings, Door-to-Door	Cost Concerns	Access
Vehicle Design Factors	Accessibility, Ease of Use	N/A	
Operational Factors	Trust, Community Friendly, Environmentally Friendly	Lack of Trust in Operations	Credibility
Vehicle Design Factors	Trust	Type and Level of Noise Emissions	
Operational Factors	Safety	Data Concerns, Crowding, Lack of Perceived Safety, Safety of People on the Ground, Time of Day and Altitude of Trip, Perceived Risk, Willingness to Share UAM Trips	Security
Vehicle Design Factors	Safety	Crowding, Lack of Perceived Safety, Size/Dimensions, Seat Capacity	
Operational Factors	Efficiency, On-Demand Mobility, Usefulness, Availability, Convenience, Value of Time Savings	Varying Trip Preferences, Travel Time, Trip Purpose	Competence
Vehicle Design Factors	Efficiency, Convenience	Range, Cruise Speed	
Operational Factors	Comfort	N/A	Courtesy
Vehicle Design Factors	Comfort	N/A	

2.4. Identification of Gaps & Limitations from the Literature

As can be seen from the literature, there has been an overall main focus on the identified key factors and their influences on the “customer usage of UAM services”. However, as mentioned earlier, the literature fails to investigate how the identified key factors influence each other and what that signifies for the “customer usage of UAM services”.

This leads to the following two questions, “Are there one or multiple factors that are more critical than other factors in affecting service usage?” and “Can focusing more favorably on one factor have an offsetting effect on service usage problems derived from other factors?”. Therefore, an investigation into the “nature of association”, between “UAM service adoption” factors, can fill a gap in the literature, reveal the relative importance between factors, and deepen our understanding of the key factors influencing the “customer usage of UAM services”. Additionally, investigating the “nature of association” also allows for a gap to be filled from the “perceived service quality” literature because Parasuraman et al. (1985) specify that there is a need for future research regarding the association influences between “perceived service quality” factors. While this is not the main focus of this research, it is further discussed at a later stage in this paper.

Furthermore, there is a need for up-to-date research on the key factors influencing the “customer usage of UAM services”, as perceived by customers, since current UAM service adoption literature only goes until 2021. This is supported by the fact that it is currently 2022 and customer perceptions have changed. In addition, there is a need to investigate the identified key factors in order to determine whether conflicts exist between the literature findings and the results of this research. All of this allows for “contemporary relationships” to be concluded in relation to the key factors influencing the “customer usage of UAM services”. Overall, the research question, “To what extent are key factors influencing the customer usage of UAM services?”, is investigated by determining the “contemporary relationships” and “nature of association” surrounding the identified key factors.

3. Empirical Strategy

3.1. Research Approach

In order to tackle the research question, “To what extent are key factors influencing the customer usage of UAM services?”, an inductive research approach is utilized so that data is first collected and analyzed, where conclusions are drawn in relation to the findings from the literature. Specifically, an in-depth case study is performed in order to frame the research question around the use of UAM services, where the identified key factors, from the literature on UAM service adoption and service quality, are qualitatively assessed and compared. Additionally, this research makes use of grounded theory as the basis for how data is collected and analyzed. However, the employment of grounded theory has been adjusted in several ways in order to meet the needs of this research. To begin with, the iterative process of grounded theory, where coding and then adjusting after every interview is the guideline, is not entirely followed (Delve, 2022b). Instead, coding occurs once all of the data has been collected due to time constraints. The second adjustment relates to the fact that grounded theory usually entails the formation of a new theory. In contrast, this research does not form a new theory but rather re-enforces theory by inductively expanding upon the collected literature, and its identified key factors, when comparing the research results to the findings of the literature. Therefore, the collected primary data is used to build upon the collected secondary data derived from the in-depth case study. The final adjustment relates to the use of selective coding in grounded theory. Selective coding usually entails the creation of a core category that is connected to all of the codes and categories derived from open and axial coding. However, this research extends the

process of selective coding by creating multiple core categories. This is because there are a wide range of identified key factors to investigate, which makes the creation of multiple core categories necessary in order to expand upon current theory in a meaningful way. Furthermore, the grounded theory approach, for this research, makes use of thematic analysis, to some degree, when capturing themes and insights related to the collected literature. These themes and insights are also used to create codes and categories that re-enforce current theory. Overall, this research combines elements of an in-depth case study with the use of an adjusted grounded theory in order to investigate the key factors influencing the “customer usage of UAM services”. The limitations produced by this research approach are acknowledged at a later stage in this paper.

The investigation of the research question entails identifying the key factors influencing the “customer usage of UAM services” and determining the extent of these influences, where the reasons for why this is occurring are also examined. Furthermore, this relates to how the influences, on the “customer usage of UAM services”, are impacted by the associations that factors have with one another. Therefore, as mentioned in Section 2.4. of this paper, this research aims to determine the “contemporary relationships” and “nature of association” surrounding the identified key factors in order to gain a comprehensive understanding of the key factors influencing the “customer usage of UAM services”.

As for the nature of the research approach, it is exploratory due to the fact that UAM services are an emerging market, where UAM services currently remain in the prototype phase of development. Furthermore, there is a need for more up-to-date and in-depth research, surrounding these services and the factors influencing their customer usage, so that UAM services can be successfully introduced into society. This is supported by the meaning of exploratory research, which is a methodology approach that investigates research questions that haven’t been studied yet in sufficient depth (George, 2022a). Additionally, the research approach is qualitative and interpretative since exploratory research is open-ended and flexible by nature (George, 2022a). Furthermore, this research makes use of customer perceptions surrounding the research question. Therefore, the use of qualitative techniques is appropriate since it allows for perceptions, insights, and relationships, on human-related activities and social phenomena, to be collected at a more meaningful level than quantitative techniques can offer (Miller, 2019).

3.2. Research Measurements

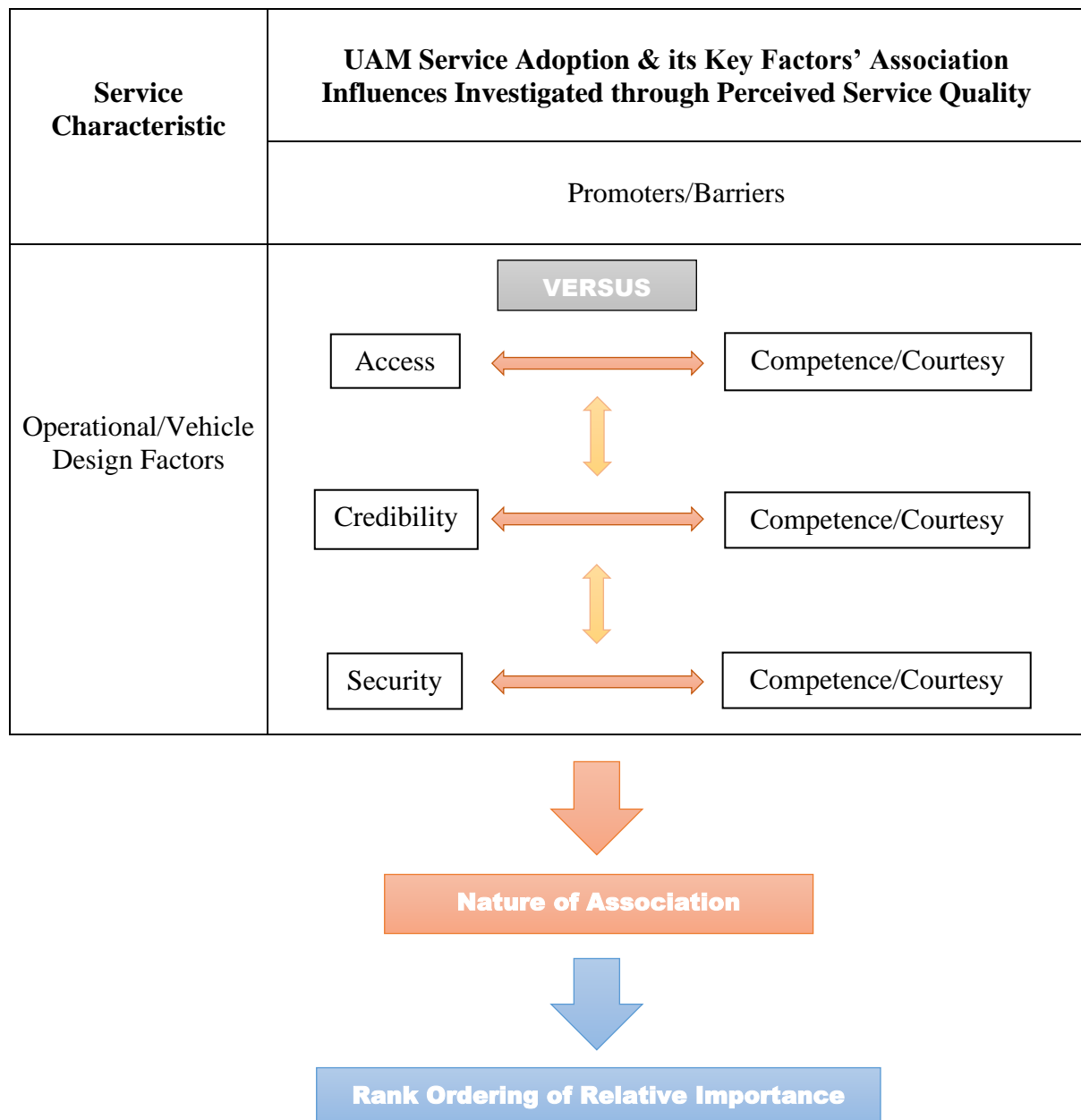
The operationalization of customer perceptions, throughout this research, is conducted using various conceptual measurements due to the qualitative nature of this research. These conceptual measurements are used as empirical proxies for theoretical concepts so that redundancy in concepts is avoided and so that variables are clearly labeled and categorized to allow for optimal data analysis.

The conceptual measurements represent the identified key factors stated in the collected literature. Specifically, key factors are labeled as either “promoters” or “barriers” to the “customer usage of UAM services”, where factors are categorized under two distinct service characteristics, which are “operational factors” or “vehicle design factors”. Furthermore, “UAM service adoption” and “perceived service quality” are two conceptual measurements that are categorized as “dimensions of customer usage”, where key factors are derived from either dimension. The purpose of these conceptual measurements is to allow for simplicity and clarity when determining “positive” or “negative” relationships between the key factors, their respective dimensions and categories, and the “customer usage of UAM services”. Theoretically, “promoters” exhibit support for their respective dimension and thus the

“customer usage of UAM services”, while “barriers” exhibit a lack of support. Section 2.3.3. of this paper illustrates the table of the constructed theoretical framework in relation to the conceptual measurements used throughout this research. Furthermore, Section 2.3.3. provides further clarification and explanation surrounding the table and its elements.

This research tackles the identified gaps from the “UAM service adoption” literature by qualitatively assessing and comparing the “nature of association” that exists between the factors, when applied to UAM services. This is exclusively done with the selected five key factors from “perceived service quality”, where these factors represent all of the identified key factors from the “UAM service adoption” literature. Furthermore, as previously explained in the theoretical framework and literature review, only relevant components from the literature are used throughout this research. Below is the figure that exhibits the extension of the constructed theoretical framework shown in Section 2.3.3. of this paper, where this extension is used to determine the “nature of association” between the “UAM service adoption” factors and how those associations influence the “customer usage of UAM services” based on their relative importance, which is determined from the research results:

Figure 1: Extension of Constructed Theoretical Framework



As can be seen from Figure 1 on the “nature of association”, there are additional conceptual measurements that require elaboration. To begin with, the “nature of association” is a conceptual measurement that is used to label the various association influences that exist between the factors, where these influences are determined from the research results. In addition, “rank ordering of relative importance”, in relation to the “customer usage of UAM services”, is a conceptual measurement that is used to represent the rank ordering of factors after their “nature of association” is determined from the research results. This will allow for the factor, with the strongest importance or influence on the “customer usage of UAM services”, to be ranked as “number one”, thus revealing the factors that should be mainly focused upon when introducing UAM services into society. Furthermore, this reveals the level of support that factors possess for the “customer usage of UAM services” in relation to their relative importance and association influences.

3.3. Data Collection

3.3.1. Data Collection Methodology

This section elaborates upon the three main segments of the data collection methodology, which are the methods of data collection, the nature of the collected data, and the data collection environment.

In order to investigate the key factors influencing the “customer usage of UAM services”, an in-depth case study is performed that utilizes primary and secondary data. This type of study allows for the formulation and assessment of generalizations across numerous cases and pieces of literature (Knight, 2001). Since the aim of this research is to do exactly this, using collected customer perceptions, an in-depth case study is appropriate.

The primary data for this research comes in the form of interview data surrounding customer perceptions on the identified key factors from the literature. Therefore, qualitative in-depth executive interviews are conducted with the purpose of gathering raw data from interview transcriptions. Interview transcriptions are attained through consensual recordings of the interviews. The interviews are semi-structured for this exploratory research, which allows for the interview to retain the element of openness and objective comparison between interviewees (Pollock, 2019). This is done to allow new ideas to come into the interview discussion, which is highly advantageous when gathering qualitative data on the perceptions held by interviewees. The duration of the interviews is set at a maximum of thirty minutes. The reason for this interview time limit is to avoid exhaustion, for both the interviewer and interviewee, so that responses are optimal and don't fall prey to diminishing returns. The goal of this research is to interview at least twelve individuals so that generalizable results can be attained. Furthermore, interviews are conducted offline or online, where participants are sourced from various locations across the globe. Online interviews are conducted using Microsoft Teams or Google Meet, while offline interviews are conducted face-to-face at an agreed upon location. It is important to note that, while the SERVQUAL model is a means of quantitative assessment of service quality, the scale from the model was developed using qualitative approaches. In this research paper, a qualitative assessment and comparison are performed on the key factors from “perceived service quality”, as derived from the SERVQUAL model's scale, where the “perceived service quality” factors correspond with their related “UAM service adoption” factors. This further supports the use of qualitative interviews as a method of data collection.

Moreover, the use of interviews is advantageous for a variety of reasons. To begin with, interviews provide the ability to form relationships from results that are useful for practical application. Interviews also make use of smaller sample sizes compared to other research approaches, which allows for the formulation of generalizations that can be applied to the general population at a deep level. The fact that interviews allow for specific insights to be developed, where the potential for bias is eliminated, is another valuable advantage. Furthermore, interviews retain a predictive quality and allow for individual experiences to be converted into usable data (Miller, 2019).

As mentioned earlier, the in-depth case study of this research makes use of primary and secondary data. The secondary data is collected through the use of online desktop research, where Google Scholar is the main search engine used. Key words such as customer usage, adoption, UAM services and service quality are used to identify relevant literature. The use of secondary data is advantageous because it allows for the literature to act as organizing theoretical principles. Furthermore, this provides the ability to form conceptual measurements from the identified key factors in the literature, which are used to develop interview structures

for the collection of primary data. In addition, the secondary data on “perceived service quality” acts as a supplement of relevant literature, alongside the “UAM service adoption” literature, by revealing the factors that influence an individual’s decision to use a service.

Overall, the inductive in-depth case study is conducted by performing a qualitative comparative analysis between the primary and secondary data. This is done so that the primary data, as coded and analyzed results, can be compared with the findings stated in the literature. Furthermore, this is supported by discussing any potential conflicts that may exist between the different pieces of literature and what they state in comparison with one another. Using the constructed theoretical framework and its extension, the in-depth case study can determine the “contemporary relationships” and “nature of association” surrounding the identified key factors influencing the “customer usage of UAM services”.

3.3.2. Sampling Strategy

3.3.2.1. Sampling Description

The sampling method utilized to reach potential interviewees is one of non-probability sampling. Specifically, this research makes use of purposive sampling. This entails, as a researcher relying on one’s own judgment, that specific perspectives are pre-determined in relation to the selection criteria of participants and the needs of the research (Dudovskiy, 2011). In this research, that relates to the identified key factors from the literature, the constructed conceptual measurements, and customer perceptions with regards to the type of interviewee that is selected. This research also makes use of convenience sampling as a method to sample from those around the researcher and from the researcher’s own network (George, 2022b). Furthermore, interviewees are self-selected and contacted via social media, email or word-of-mouth. Therefore, LinkedIn, WhatsApp, Instagram, Facebook, Gmail and Microsoft Outlook are used to contact potential interviewees by sending text messages or emails.

3.3.2.2. Selection Criteria

The selection criteria consist of multiple components that are used to ensure effective documentation and replicability of the research process and results. To begin with, respondents are selected on the basis of three major modes of transportation in relation to their level of income and tech savviness. The three modes entail that respondents are either frequent public transportation users, frequent airline users, or frequent private car users. Furthermore, the level of income and tech savviness is scaled at a high or low level. In addition, there are no other selection criteria beyond this, which means that respondents can be of any age or gender for example. The purpose of this selection criteria is to provide this research with the ability to collect data on individuals that are frequent users of different modes of transportation since UAM services are an emerging alternative mode of transportation. Therefore, collecting customer perceptions surrounding UAM services, from users that are familiar with other modes of transportation, can offer this research valuable insights since these individuals are potential future users of UAM services. Furthermore, income and tech savviness, as two side factors influencing an interviewee’s responses, are included to add depth to the research results.

Ideally, twelve interviews are conducted across the three modes of transportation in the first two quarters of 2022. As mentioned earlier, the interviews have a maximum time limit of thirty minutes. The different combinations of interviewees, according to the selection criteria, consist of four frequent public transportation users, four frequent airline users, and four frequent private car users. Each category is subject to having an interviewee that is high income/low tech savvy, high income/high tech savvy, low income/low tech savvy, and low income/high tech savvy. These combinations allow for diversity and balance to exist between

the interview participants so that a claim can be made on the generalized conclusions derived from the research results.

Moreover, interviewees are matched with the selection criteria on the basis of multiple conditions. Interviewees are deemed as frequent public transportation users if they use public transportation at least five times per week. Frequent airline users are individuals that take flights at least twice per month. Frequent private car users are individuals that drive at least five times per week. Low income interviewees are individuals such as students or recent job market entrants, while high income interviewees are individuals with long-time professional careers. Finally, low tech savvy interviewees are individuals from an older age group or with a low level of education, while high tech savvy interviewees are individuals from a younger age group or with a high level of education. Overall, the selection criteria allow for enhanced generalizability and applicability of the research results. In addition, individual and general trends, that are important to respondents with regards to the selection criteria, are identified from the analyzed interview data in order to accurately draw conclusions in relation to the general population.

As for the methods of selection, purposive sampling was used to define the selection criteria before the interviews were conducted, where interviewees were matched with their respective selection criteria characteristics. Convenience sampling was also used because the selection criteria was identifiable within members of the researcher's own network. Additionally, since this research makes use of a small sample size, convenience sampling was able to sufficiently obtain the sample size from within the researcher's own network. Therefore, network members, who were known to possess the selection criteria characteristics, were contacted. Furthermore, other network members were also contacted since they knew potential interviewees who matched the selection criteria. The identified interviewees were reached out to via social media and email, where WhatsApp, LinkedIn and Gmail proved to be the main form of communication. Interviewees, who accepted, received a MS Teams meeting link. Furthermore, interviewees were introduced to the research similarly to what is stated in the interview opener and introduction, which are presented in the interview guide and protocol in Appendix 8.1.. In addition, interviewees were not made aware of the selection criteria that they were matched with. This was done so that responses had an opportunity to be genuine rather than being influenced by the pre-defined selection criteria. Overall, twelve potential interviewees were contacted so that there would be at least one interviewee per selection criteria combination. However, only ten interviewees responded and were interviewed. Therefore, only a high income/low tech savvy frequent public transportation user and a high income/low tech savvy frequent airline user were not able to be interviewed. Furthermore, only six interviews were processed and coded due to data saturation, in relation to the research question, and a lack of new responses. The six interviews stem from a diverse range of interviewees in order to analyze many different responses and perspectives, which makes the processed data reliable. The table with interviewees, in the results and interpretation, exhibits the individuals that were interviewed and processed/not processed.

3.3.2.3. Transparency Criteria

The interviews are conducted and guided by the researcher of this paper, who is Emiel Knaapen. Possible influences, from the interviewer, on the respondents are excluded by avoiding suggestive or sensitive wording throughout the interview. In addition, ethical considerations, such as privacy issues when collecting primary data from interviews, are addressed by asking respondents about whether their data can be used for this research. In addition, respondents are informed about the fact that their data will be anonymized, where permission is also requested so that interviews can be recorded for transcription purposes.

Respondents are informed about all of these aspects when invited to participate, through email or text messages, and during the interview so that there is informed consent. Furthermore, transcriptions of interviews are performed using a specific software program. The software is called Happy Scribe and it offers the ability to transcribe audio files and video files (Happy Scribe, 2022).

As for the reliability of the creators of the literature findings, it can be seen that reliability exists across the creators. This is because the “UAM service adoption” literature was created by legitimate businesses and researchers, such as Deloitte (2019) and Al Haddad et al. (2020), where these pieces of literature have built upon each other in different ways and have been thorough in their methodological approach when investigating UAM services. Furthermore, the SERVQUAL model literature has been commonly used in relation to other services beyond the ones studied in the literature created by Parasuraman et al. (1985).

3.3.3. Interview Structure

The structure of the interview makes use of an inductive approach since this research is inductive and qualitative by nature. This signifies that the interview questions are used to qualitatively assess and compare the key factors and relationships identified in the literature, where a qualitative comparison is made between the research results and the literature findings by utilizing inductive reasoning. Furthermore, the extension of the constructed theoretical framework, on the “nature of association”, is an inductive framework because there haven’t been any investigations into how the factors associate with one another. Therefore, there are no preconceived ideas or conclusions to confirm in relation to the “nature of association”, which reveals that the associations between factors are inductively determined. Overall, this research aims to inductively expand upon the constructed theoretical framework and its extension by allowing the research results to determine new themes and insights that are important (George, 2022b).

Due to time constraints and the wide range of identified key factors, there is a need to prioritize specific factors over others in order to maximize the attainable results in a feasible manner, where valuable insights can still be collected. Furthermore, some factors are highly interconnected or essentially the same. This means that the prioritized factors have the ability to offer insights on some of the non-prioritized factors, when investigated throughout the interviews. It is important to note that some factors and associations have been prioritized in order to be feasibly investigated within the thirty-minute time limit of the interviews, regardless of their connection or similarity to other factors. Therefore, the interviews will consist of twelve questions in total, where the first section has nine questions, and the second section has three questions. Overall, the interview guide and protocol are structured in a way that still allows for a focused and relevant investigation to occur on the key factors influencing the “customer usage of UAM services”. The limitations produced by this prioritization process are discussed at a later stage in this paper.

As mentioned earlier, the structure of the interviews and the order of the questions are established in relation to the needs, feasibility and relevance of this research. To begin with, the interview is divided into two sections, where the constructed theoretical framework and its extension are used as guidelines for the structures of the two sections. The first section focuses on “UAM service adoption” and the “nature of association”, where “UAM service adoption” factors are represented by the related five “perceived service quality” factors. The second section of the interview focuses on the prioritized “UAM service adoption” factors, where these factors are not being represented by the related five “perceived service quality” factors. These factors are prioritized because they provide the ability to investigate various important aspects

surrounding UAM services while still maintaining feasibility for this research. Additionally, customer perceptions surrounding the key factors are collected in order to determine whether they act as “promoters” or “barriers” to the “customer usage of UAM services”, where they either exhibit support or a lack of support for UAM service usage. Furthermore, this allows for “contemporary relationships” to be determined from both interview sections.

Adding on to the first section of the interview, the key factors of “access”, “credibility”, and “security” are investigated as “perceived service quality” factors representing their related “UAM service adoption” factors. In addition, “access” is worded as “accessibility” so that interviewees understand the factor in question. “Competence” and “courtesy” are the other two “perceived service quality” factors being investigated, where they are each compared with “access”, “credibility”, and “security” in order to determine their “nature of association”. Therefore, the differences in how “competence” and “courtesy” associate with “access”, “credibility”, and “security” can be determined. The second section of the interview investigates the key “UAM service adoption” factors of “comfort”, “convenience”, “environmentally friendly”, “community friendly”, “trip purpose”, “size/dimensions”, and “time of day/altitude of trip”. As for the use of prompts in the interview, this offers the ability to collect guided insights surrounding the prioritized factors, related factors, and non-prioritized factors. The utilized prompts can be found in Appendix 8.1.. Overall, prompts allow for a maximization of the prioritization process. In addition, the semi-structured and open-ended nature of the interviews allows for the use of prompts that act as spontaneous questions for deeper exploration. It is important to note that some of the factors relate to both service characteristic categories, which are operational factors and vehicle design factors. This allows for factors to be investigated in relation to vehicle design factors even when an interview question does not explicitly relate to vehicle design factors.

3.4. Data Analysis

The method of data analysis, for this research, is inductive by nature. In order to utilize the collected primary data, a data simplification process is required. This allows for the interview data to be organized and processed into smaller and more manageable components (Basit, 2003). The data simplification process, as mentioned earlier, entails the use of an adjusted grounded theory. This research approach is used to inductively expand upon the collected secondary data using the collected primary data, where a re-enforcement of theory takes place. Furthermore, thematic analysis is used, to some extent, to identify themes throughout the interview transcriptions. This is performed by conducting an interview analysis, where identified themes and relationships are coded and categorized (Medelyan, 2021). This allows for patterns to be recognized, between the interviewees, so that specific insights are determined. This research approach is fitting because conclusions and relationships are determined in a complete and unbiased manner, which allows for responses to be optimally analyzed. In addition, grounded theory is ideal for discovering new insights, strongly connecting the research results to the literature findings, and accurately representing the research results in real world settings (Delve, 2022b).

Moreover, the coding is performed manually for this research. The coding process consists of inductive coding, also known as open coding, where codes are created as the data is being processed. Furthermore, there is no pre-built set of codes and codes can be adjusted or removed when going through the raw data (Watson-Wailes, 2021). Axial coding is the second stage of the coding process, where this type of coding is performed after the open coding. Axial coding entails creating categories for the codes, which are derived from the open coding, so that connections and comparisons can be made between the codes (Delve, 2022a). Selective coding is the third stage of the coding process and entails the creation of core categories that

encompass all of the open coding and axial coding results. The core categories act as the core ideas behind the re-enforcement of theory that is produced by the adjusted grounded theory approach (Delve, 2022b). The type of codes that are developed are “in vitro” codes because they reflect the descriptions and perceptions being shared by interviewees. These codes are also known as descriptive codes and can assist in coding responses that are described in multiple ways by different interviewees (Watson-Wailes, 2021). The coded results are visualized by a mind map that exhibits all of the connections and categories determined by the coding process. The mind map is presented in the form of a hierarchical coding frame in order to clearly visualize the relationships and themes that exist between the codes. Furthermore, SimpleMind is the software tool being used to construct the mind map of the coded results (SimpleMind, 2022).

As for the expected type of outcomes for this research, these can be found in Section 2.3. of this paper. There are no expected relationships for the “nature of association” since there are no existing pieces of literature to derive them from, which is why they must be inductively determined. Overall, the expected relationships from Section 2.3. assist in the coding process by producing awareness of key words, such as “promoters”, “barriers”, “importance”, and “preference”, so that codes and insights are simpler to determine.

Ultimately, the coding process is presented in two segments. To begin with, the open coding results are presented in a table of coded results. As for the axial and selective coding results, these are presented in the table too and in a visualized mind map that links back to the open coding results. The visualized mind map exhibits all of the insights, collected from the interviews, as individual, general, association, relative importance, contemporary, and newly discovered insights in relation to the “customer usage of UAM services”. Additionally, the mind map exhibits all of the codes, categories, and themes determined from the coding process. Furthermore, the results and interpretation include the selection criteria’s influence on each interviewee and their responses. The coding process also assists in determining whether factors are promoters, barriers or mixed depending on the context. Additionally, thematic analysis occurs when themes are captured throughout the three stages of the coding process. Overall, the adjusted grounded theory approach can determine and inductively expand upon the “contemporary relationships” and “nature of association” surrounding the identified key factors influencing the “customer usage of UAM services”. This informs UAM service developers about the factors that should be focused on or avoided in order to successfully introduce these services into society.

4. Results & Interpretation

4.1. Data Sources

Table 2: Table with Interviewees

Table with Interviewees						
Characteristics	<i>Interviewed/Processed</i>					
<i>Mode of Transport</i>	Frequent Public Transportation User	Frequent Public Transportation User	Frequent Airline User	Frequent Airline User	Frequent Private Car User	Frequent Private Car User
<i>Income</i>	Low	High	Low	High	Low	High
<i>Tech Savviness</i>	High	High	High	High	High	High
<i>Gender</i>	Male	Male	Male	Male	Male	Male
<i>Age</i>	>25	<45	>25	<45	>25	<45
<i>Interview Duration</i>	33 minutes	21 minutes	24 minutes	30 minutes	22 minutes	21 minutes
Characteristics	<i>Interviewed/Not Processed due to Data Saturation</i>					
<i>Mode of Transport</i>	Frequent Public Transportation User	Frequent Airline User	Frequent Private Car User	Frequent Private Car User		
<i>Income</i>	Low	Low	Low	High		
<i>Tech Savviness</i>	Low	Low	Low	Low		
<i>Gender</i>	Male	Male	Male	Male		
<i>Age</i>	>25	>25	>25	<45		
<i>Interview Duration</i>	20 minutes	22 minutes	21 minutes	22 minutes		

4.2. Processed Data Collection

Table 3: Coding Scheme of Exemplary Results

Example Quote	Description	Open Coding Codes	Axial Coding Categories 1	Axial Coding Categories 2	Selective Coding Core Categories	# Of Interviews for Axial Coding 1	# Of References for Axial Coding 1
<i>"Intermodal movement between, for example, the landing pad and the metro would be really important to me. You know, you just want it all to be seamless. I would definitely pay more to land at an UAM airport that is very near to other modes of transport instead of having to walk for like 15 minutes to where I need to go after I land."</i>	Customers perceive "access" as a key positive factor that is required for seamlessness and service usage, where the willingness to pay, for both low and high income customers, is overall directed at "access" rather than other factors.	Expected seamlessness and willingness to pay	Access as a promoter	General consensus	Access ranked as #1 in importance	5	8
<i>"For example, with Uber, you just want the ride to get you easily from spot A to spot B instead of having a very friendly Uber driver that brings you to the wrong location, because then you are still annoyed."</i>	Customers value "access" over "courtesy" since getting easily from point A to B is of utmost importance rather than friendliness and hospitality.	Effortless ride between point A-B	Access over courtesy	General consensus	Access ranked as #1 in importance	4	5
<i>"For example, you see all of these shared scooters in Amsterdam and the great part of it is that there are always available vehicles that you can essentially take anywhere. Otherwise, people wouldn't use them because they can't depend on them."</i>	Customers value "competence" over "access" since available vehicles are required in order for customers to be able to depend on UAM services.	Required availability and dependability	Competence over access	General consensus	Competence ranked as #2 in importance	3	4
<i>"If the trip saves me time and the vehicle will always be there when I need it then I am going to love the service. But if these things become difficult then that's not going to work for me."</i>	Customer perceives "convenience" as a key positive factor in relation to time savings and availability. However, it is a key negative factor if "convenience" is absent.	Required convenience and the value of time savings and availability	Convenience as a promoter/barrier	Individual consensus	Competence ranked as #2 in importance	1	2
<i>"The most important thing to me is that I can skip traffic on the highway when going from city to city. Across the city, well, I would use that a lot if it means that I don't have to go down into a metro. But intra-city travel would compete with any alternative modes of transport because all I care about is getting from A to B in the most convenient way possible."</i>	Customers perceive "trip purpose" as a positive factor when inter-city and intra-city travel save time and avoid traffic in comparison with other modes of transportation.	Preference for inter-city and intra-city travel through time savings and traffic avoidance	Trip purpose as a promoter	General consensus	Competence ranked as #2 in importance	4	4
<i>"Credibility greatly influences my decision. If something happens up in the air, then the chances of survival are much lower, so the reputation of the service needs to be at a high level."</i>	Customers perceive "credibility" as a positive and negative factor depending on the reputation of the service.	Required high level of reputation	Credibility as a promoter/barrier	General consensus	Credibility ranked as #3 in importance	3	3
<i>"I would be very comfortable with autonomous as long as I see evidence first. But I trust the technology will be developed enough by that time to be credible enough to use. Also, I would much rather use autonomous flying vehicles than autonomous vehicles on the ground surface since there are less factors in the air to consider, and I would have no need for a pilot if I used autonomous flying vehicles."</i>	Customers perceive "community friendly" as a key positive factor if autonomous technology is used in UAM vehicles. However, evidence is needed before usage.	Preference for autonomous technology and required evidence	Community friendly as a promoter	General consensus	Credibility ranked as #3 in importance	4	4
<i>"I think that you need to look at the regulations and infrastructure that are needed for these vehicles. If there are designated airways, then the vehicles should stay there and not bother people beyond the infrastructure limits."</i>	Customers perceive "community friendly" as an inconsequential factor due to infrastructure for isolating noise emissions to.	Isolation of noise emissions to designated infrastructure and insignificance of noise emissions	Inconsequential community friendly	General consensus	Credibility ranked as #3 in importance	4	4
<i>"Well, if you look at buses, they carry many people on the ground, whereas cars are more for personal use. I see these UAM vehicles being more like cars. So, since many of these vehicles are going to be launched into the sky, there needs to be sustainability on mass because otherwise it's just going to add to the current environmental problems, which I wouldn't want to see happen."</i>	Customers perceive "environmentally friendly" as a key positive factor because of environmental concerns in relation to the large number of UAM vehicles that will be operating in the future.	Pro-sustainability	Environmentally friendly as a promoter	General consensus	Credibility ranked as #3 in importance	5	5
<i>"If there is a problem and I contact customer service and they can help me solve the problem immediately, then I'm fine with using the service still, even if the</i>	Customer values "competence" over "credibility" when the						

<i>problem damages their credibility. But if I am left hanging there then I don't want to use the service again."</i>	customer service is always available to solve issues despite a reduction in credibility.	Responsive customer service	Competence over credibility	Individual consensus	Competence ranked as #2 in importance	2	2
<i>"I expect everyone's data to be abused already by other companies. For travel data, they could trace me back to my routes but not much more. I wouldn't really worry about it."</i>	Customers perceive "security" as an inconsequential factor since data usage and abuse are very widespread already.	Insignificance of data usage	Inconsequential security	General consensus	Security ranked as #4 in importance	3	3
<i>"As long as they comply with data laws, like in Europe for example, I don't see why they can't use my data."</i>	Customer perceives "security" as a positive factor when data laws are followed.	Law-abiding data usage	Security as a promoter	Individual consensus	Security ranked as #4 in importance	2	2
<i>"No more than six people and no more than one stop between me and where I'm going to. I would pay more to make this happen if I took a UAM vehicle. If it's a direct flight from A to B and there is an empty seat, go ahead I don't care, fill the seat. But if I get on and there are 19 stops and I'm person 20, then why am I paying the premium to use this vehicle, I might as well hop in an Uber."</i>	Customers significantly consider the number of stops on the way rather than the "size/dimensions" and the "crowding" of the vehicle.	Minimized stops over vehicle size and crowd	Inconsequential size/dimensions and crowding	General consensus	Security ranked as #4 in importance	3	3
<i>"I would say that smaller is preferable. Having 5 people in the vehicle is good enough for me. At least be under 12 people because I read an article, which stated that optimal group conversation comes from having less than 12 people in a closed space because it creates unity."</i>	Customer perceives "size/dimensions" as a positive factor when the number of people inside the vehicle is less than twelve, otherwise it will negatively influence the group conversation due to a lack of unity.	Preference for small amount of passengers	Size/dimensions as a promoter/barrier	Individual consensus	Security ranked as #4 in importance	2	2
<i>"I definitely prefer to fly above the buildings just because I think it's safer. I don't really care about the time of day though, as long as it's safe."</i>	Customer perceives "time of day/altitude of trip" as a positive factor when flying safely at a high altitude and during any time of the day. UAM services only offering low altitude travel makes it a negative factor due to safety concerns.	Preference for high altitude travel and insignificance of time of day	Time of day/altitude of trip as a promoter/barrier	Individual consensus	Security ranked as #4 in importance	1	1
<i>"Maybe at a later stage in my life, if I had the money, I would pay for courtesy but, like I said, I rather choose accessibility over courtesy."</i>	Customers value "access" over "courtesy" due to cost concerns and a low income reducing the need for hospitality.	Hospitality as a luxury	Access over courtesy	General consensus	Access ranked as #1 in importance	4	5
<i>"On longer flights I am willing to pay a premium for more comfort, I will always make that decision if possible."</i>	Customer is willing to pay for extra "comfort" if trip duration is long.	Need for comfort on long trips	Courtesy over access	Individual consensus	Courtesy ranked as #5 in importance	2	2
<i>"If I compare comfort and convenience, I prefer to have more comfort because I'm just going from A to B, so I would appreciate some comfort during my travels. I also need comfortable seats because otherwise I can't get work done during the ride in a professional way, and that is costly to me and my productivity."</i>	Customer values "comfort" over "convenience" in order to enjoy the trip more and be productive in a professional manner.	Need for professionalism through comfort	Comfort over convenience	Individual consensus	Courtesy ranked as #5 in importance	1	1

results is high due to data saturation and the diversity of responses producing reliable, accurate and in-depth results. As for the selective core categories, these reveal the most or least important/influential factors that should be focused on or avoided, when developing UAM services, in order to boost the “customer usage of UAM services”. Selective core categories, in relation to the relative importance of factors according to customers, were determined based on the frequency of preference and influence, as perceived by interviewees. A higher frequency of preference for a factor, in combination with a greater number of positive perceptions, indicates that a factor is more important or influential than another factor. In contrast, a lower frequency of preference for a factor, in combination with a greater number of negative perceptions, indicates that a factor is less important or influential than another factor. Additionally, there are some responses that reveal the inconsequentiality of a factor or that reveal a mixed perception surrounding a factor. These were also considered when producing the “rank ordering of relative importance” for the factors.

Figure 2 visualizes the five selective core categories, at the top of the hierarchy, as central themes that connect to their respective axial categories and open codes. Furthermore, “access” was identified as the most important factor to customers, where the other four core categories surround “Access Ranked as #1 in Importance” due to being less important. “Axial Coding Categories 2” are represented in green, where they connect to the blue “Axial Coding Categories 1”. “Open Coding Codes” are represented in red, where they connect to their respective “Axial Coding Categories 1”. In addition, the coding scheme of all the processed results can be found in Appendix 8.2.

When examining the processed data, it was identified that “access” and “competence” came very close to each other in relation to preference and positive perceptions. From the six interviewees, five interviewees had positive perceptions surrounding “access”, four preferred another factor over “access”, four preferred “access” over another factor, and zero negatively perceived “access”. In comparison, “competence” was ranked as the second most important factor because four interviewees preferred another factor over “competence” while five preferred “competence”, where “convenience”, as a related “UAM service adoption” factor to “competence”, was perceived as a promoter/barrier by one interviewee, as a promoter by another, and as an inconsequential factor by another. Therefore, the fact that “access” had no negative or inconsequential perceptions indicated that it was more important to customers than “competence”. Furthermore, the low and high income interviewees decided that “access” was preferable because it was perceived as the most beneficial factor to focus on in relation to their value of money and their affordability, where utility was praised over most other factors. Additionally, “trip purpose”, as a related “UAM service adoption” factor to “competence”, was perceived positively, by the frequent public transportation interviewees and the high income/high tech savvy frequent airline user, due to the excitement of flying for inter-city travel in order to avoid traffic and save time. However, the low and high income frequent private car users and the low income frequent airline user perceived “trip purpose” as being inconsequential as long as they are brought from point A to B in an effortless manner as can be seen from Table 3, which shows favor for “access” over “competence”. Furthermore, there was a general consensus on the fact that there needs to be “expected seamlessness” in a service, where hospitality is insignificant due to a preference for “ease-of-use” over friendliness. Both low and high income interviewees revealed that hospitality was a luxury or unnecessary, due to cost concerns and/or a preference for utility. It is interesting to see that only one interviewee, specifically the high income/high tech savvy frequent private car user, preferred automation in all service aspects rather than interacting with a human being. These insights reveal a rather large general consensus on the unimportance of “courtesy”. However, the low income/low tech savvy frequent airline user was the only one to value “courtesy” more than the other

interviewees. He said that he had a need for “comfort” during the trip in order to be able to work for his job productively and professionally on the ride. This reveals an individual consensus from only one interviewee, as can be seen from Table 3, and therefore indicates that there are outliers in the population who care about “courtesy” over other factors. Furthermore, there was an individual consensus, from the high income/high tech savvy frequent private car user, that long trips require “comfort”, where his level of income made the price to pay for “comfort” insignificant. Overall, though, “courtesy” was ranked as the least important factor because the majority of interviewees disregarded hospitality as a need or want.

“Credibility” was ranked as the third most important factor to interviewees because of a need for evidence by four interviewees, a preference for autonomous technology in relation to the related “UAM service adoption” factor of “community friendly”, exhibited “pro-sustainability” by five interviewees in relation to the related “UAM service adoption” factor of “environmentally friendly”, and a lack of care for “noise emissions” by four interviewees. However, even though many interviewees greatly valued “credibility”, there was a general consensus, from three interviewees, that “availability” and “dependability” were critical in their decision-making process to use UAM services. In addition, there was an individual consensus, from two interviewees, that “responsive customer service” is required over “credibility”. This is because the two interviewees felt that, even when there are a few credibility issues, as long as the service recognizes the issues and makes the initiative to solve them, it is okay to continue using the service. Therefore, “competence” was valued over “credibility” in that sense, but a service that doesn’t provide “responsive customer service” will lose these two types of individuals as customers.

As for “security”, this factor was ranked fourth in importance because of a large number of responses indicating an overarching inconsequentiality for the related “UAM service adoption” factors. To begin with, there was a general consensus, from three interviewees, that “data concerns” were insignificant due to data usage and abuse being already so widespread. However, there was an individual consensus, from two interviewees, that made “security” a promoter when the service uses customers’ data for service improvement, price reduction, and according to data laws. Therefore, UAM services should be wary of their data usage practices or otherwise face a loss of these two potential customers. Furthermore, “security” also ranked so low in importance because of the perceptions surrounding the related “UAM service adoption” factors of “size/dimensions” and “time of day/altitude of trip”. In relation to “size/dimensions”, there was a general consensus, from three interviewees, that this is inconsequential due to the preference for utility and effortlessness, which relates back to the positive perceptions for “access”. Interviewees prefer to have less stops on the way and want to get from point A to B without much hassle, where the “crowding” of the vehicle is less significant to them. However, there was an individual consensus, from two interviewees, that there should be a minimal number of passengers inside of the vehicle for security reasons or for an optimal climate that supports group conversation. As for the “time of day/altitude of trip”, there was a general consensus that this factor is insignificant due to, once again, simply wanting to get from point A to B quickly and easily, which shows favor for “access” over “security”. Overall, “security” was perceived positively by only two interviewees, negatively perceived by four interviewees, and inconsequentially perceived by three interviewees. Furthermore, “security” was mainly preferred over “courtesy”, by four interviewees, thus revealing its lack of importance in comparison with other factors such as “access”, “competence” and “credibility”. It is important to note that, even though “access” is the most important factor and “courtesy” is the least important, “competence” is also very important since it is closely related to “credibility” and “security”. This is due to a few interviewees perceiving “credibility” and “security” as an indicator of a service’s “competence”.

As can be seen from the processed results, the “contemporary relationships” and “nature of association” were determined in an effective manner that clearly reveals the “rank ordering of relative importance” with regards to the various related factors, thus contributing to filling the gap in the “UAM service adoption” literature in relation to how the key factors influence each other and therefore the usage of UAM services. Furthermore, the extent of the influences on the “customer usage of UAM services” were determined through the identification of factors as either being promoters, barriers, mixed, or inconsequential, where the frequencies of perceptions and the reasons for perceptions were meaningfully considered. As for any alternative explanations for the research results, there may be the possibility of culture, gender, or biases acting as additional side factors in the decision-making process of interviewees, where these factors would need to be considered in future research.

5. Discussion

5.1. Comparison of Research Results & Existing Research

In light of existing research surrounding the adoption of UAM services, there are a number of comparisons to address, in relation to the findings of this paper, in order to inductively expand upon and re-enforce the collected secondary data and its theories. To begin with, Al Haddad et al. (2020) and Chaniotakis et al. (2020) concluded that value of time savings, accessibility, comfort, and cost savings promote UAM service usage by boosting customer satisfaction. In comparison, the research results reveal that they were accurate in relation to accessibility, cost savings and the value of time. This is because interviewees expressed strong positive perceptions in relation to these factors, where “access” and “competence”, and their related “UAM service adoption” factors, were ranked as the top two most important, which was supported by a large overarching general consensus. However, comfort received mix perceptions and was not necessarily a promoter according to the interviewee responses. While there were two interviewees who expressed an individual consensus for comfort as a necessity, the overarching theme revealed that comfort, in relation to “courtesy”, was not of much significance compared to other factors. Additionally, Al Haddad et al. (2020) and Chaniotakis et al. (2020) concluded that data concerns and crowding are barriers to UAM service usage. In comparison, the research results show that “security” in relation to data usage and crowding, has an overarching general consensus that these two factors are inconsequential instead of barriers. Interviewees simply want to get from point A to B as easy as possible, regardless of the number of people in a vehicle. Furthermore, interviewees possess an overall lack of care for data usage since it is so widespread already.

When comparing the research from Al Haddad et al. (2020) and Chaniotakis et al. (2020) to Garrow et al. (2021), it can be seen that similar promoters were identified for both pieces of literature. Therefore, there is a consensus between the researchers, where the results of this paper support the identification of these similar promoters in relation to “access”, and its related factors of “accessibility” and “affordability”, and “competence”, and its related factor of “time savings”. Therefore, since there is consensus between these three researchers and the results of this paper, “access” and “competence” appear to be valid as the top two most important factors according to customer perceptions.

As for Booz et al. (2018), it was identified that perceptions surrounding autonomous vehicles, pilots and trip preferences act as barriers to the “customer usage of UAM services” since they reduce the willingness to fly. These factors relate to “credibility”, and its related factor of “community friendly”, and “competence” in relation to “trip purpose”. The research results revealed that there is an overarching general consensus on “credibility” acting as a mix between promoter and barrier due to interviewees requiring evidence of technology

functionality and safety, where reputation is generally needed to support this evidence and the “customer usage of UAM services”. Therefore, it is safe to say that the factors identified by Booz et al. (2018), in relation to “credibility” and “community friendly”, are valid as barriers that can reduce the willingness to fly if there isn’t sufficient evidence and reputation. However, it is interesting to note that many interviewees expressed a strong preference for autonomous technology due to a trust in technology over the human mind, where technology never gets tired and always pays attention. As for the identified factor of trip preferences as a barrier, the research results do not support this. Overall, interviewees expressed a lack of care for trip preferences, where they were simply excited to test out both inter-city and intra-city travel in order to skip traffic and avoid possible ground transport infrastructure issues. This reveals the possibility of Booz et al. (2018) determining trip preferences as a barrier due to it being a case specific insight rather than an accurate generalizable insight. Interestingly, Fu et al. (2019) also reveals that “trip purpose” is a barrier, similarly to Booz et al. (2018). However, Fu et al. (2019) determines this perception from a case study on different modes of transportation in Munich in relation to an UAM environment. According to the research results, there is a general consensus on “trip purpose” being a promoter when the service offers drop-off locations that are in close proximity with other modes of transport. Therefore, context plays a major role in the way that customers perceive factors. Additionally, Fu et al. (2019) examines the role of perceived utility when an individual chooses between a mode of transport. This correlates with two interviewees from this research paper, where they stated that they would use UAM services only if other modes were less convenient or farther away.

When examining the literature from Straubinger et al. (2020), “noise emissions” and “size/dimensions” are identified as being barriers. However, the research results heavily counter this when examining responses in relation to “security”. There was a major general consensus that these factors are inconsequential. As mentioned earlier, the majority of interviewees simply want to get from A to B as effortlessly, safely, and fast as possible, regardless of the vehicle crowd, size, and noise. However, there was an individual consensus between two interviewees where a small number of passengers inside the vehicle is preferable due to safety or conversation concerns. Therefore, it appears that there is variability across customers, in relation to these factors, since the findings from Straubinger et al. (2020) and this paper are clashing. Furthermore, the research results reveal that “environmentally friendly” is a massive promoter supported by a large general consensus for pro-sustainability. In contrast, Straubinger et al. (2020) states that this is a barrier. The difference here may lie within the context of their research in comparison with the context of this research paper’s interview questions.

Finally, Deloitte (2019) and this research paper both found very similar outcomes in relation to age and the perceptions surrounding UAM services as an alternative mode of transportation. Deloitte (2019) determined that older generations are overall unconvinced about the safety of UAM vehicles, while younger generations found it to be an efficient alternative mode of transportation. Similarly, the high income respondents from this paper, who are all above the age of 45, expressed a need for evidence before using these vehicles. In contrast, the low income respondents, who are all below the age of 25, expressed quicker approval of UAM vehicle since these vehicles could be very convenient, accessible and cool to ride in.

While existing research has demonstrated many valuable comparisons with the results of this research, the “nature of association” gap, from the “UAM service adoption” research, has been overlooked by researchers. Therefore, this research paper contributes to filling that gap by having determined that “access” and its related “UAM service adoption” factors are the most important factors when compared with the other factors that were investigated.

Association influences were determined through comparison, where “competence” came as second most important and “credibility” came as third most important, where “courtesy” was the least important. Therefore, it can be seen that the top two important factors are more critical than the others, where focusing on them more favorably will likely lead to an offsetting effect on service usage problems derived from other factors. Overall, the “rank ordering of relative importance” for these factors, when representing their related “UAM service adoption” factors, reveals additional insights that inductively expand upon the collected secondary data and the identified key factors influencing the “customer usage of UAM services”.

5.2. Implications

The implications of this research for practitioners are highly beneficial. By revealing the “contemporary relationships” and the “nature of association” surrounding the key factors influencing the “customer usage of UAM services”, practitioners can make use of this research approach in order to determine the “nature of association” for other factors in relation to different services, products, or simply social phenomena. Furthermore, UAM service developers can make use of this research in order to be aware of the key factors that should be focused on or avoided in order to successfully introduce these services into society, where the societal benefits of traffic congestion reduction, traffic safety enhancement, and tackling the current climate crisis can be achieved.

5.3. Limitations

When examining the theoretical and empirical approach of this research, multiple limitations are identified. Due to time constraints and feasibility needs, the grounded theory approach used for this research is adjusted. As stated in the empirical strategy of this paper, there are three adjustments, where they limit the ability of the grounded theory approach to iteratively adjust codes and categories per interview, thus limiting the ability to form a new theory from the collected primary data. This can reduce the reliability and accuracy of the utilized adjusted grounded theory approach in relation to the research results. Furthermore, a prioritization process was used in this research in order to feasibly conduct the interviews. This means that some factors were prioritized over others, thus leaving room for exploration of the non-prioritized factors influencing the “customer usage of UAM services”. Therefore, this research may be missing information on other factors that could potentially be more important than “access” and its related “UAM service adoption” factors. Lastly, the use of semi-structured interviews makes the collected primary data less objective, thus limiting the accuracy of the claims derived from this research.

5.4. Recommendations & Suggestions for Future Research

The recommendations and suggestions for future research, derived from this paper, entail producing interview questions that expand the number of factors investigated, where the interview time limit is increased in order to make this possible. This would allow for more insights to be collected surrounding unexplored factors and their association influences with one another. It is suggested that future research make use of the usual grounded theory approach in order to enhance the coding process and to determine more accurate and generalizable insights in relation to the key factors influencing the “customer usage of UAM services”.

6. Conclusion

In conclusion, there are many factors that influence the “customer usage of UAM services”, however, “access” is the most important factor to consider in relation to its related “UAM service adoption” factors. “Courtesy” is the least important and should be avoided when

developing these services. The real world importance of this research is that it can assist in the successful introduction of UAM services so that traffic congestion is reduced, traffic safety is enhanced, and the climate crisis can be further minimized.

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8. Appendices & Supplementary Material

8.1. Interview Guide & Protocol

Interview Guide & Protocol

1. Interview Opener

Hello! I would just like to start this interview by thanking you for your participation. My name is Emiel Knaapen, and I am currently doing my master's thesis at Utrecht University in the Netherlands. The master's degree program that I am following is called "Business Development and Entrepreneurship". How are you doing today?

2. Introduction to the Interview and the Research

Now, I would like to introduce to you the research that is being conducted using these interviews. To start off with, this research is investigating the key factors influencing the customer usage of UAM services. UAM stands for urban air mobility and relates to an emerging market for alternative transportation. Urban air mobility mainly deals with flying vehicles that act as air-taxis within and between cities, where the passenger crew is significantly smaller than in commercial airplanes. Overall, this research aims to collect customer perceptions in relation to various operational and vehicle design factors that influence the usage of UAM services. The purpose of this research is to inform UAM service developers about the key factors that should be focused on or avoided, during development, in order to successfully introduce these services into society. The interview shouldn't last longer than thirty minutes and will be divided into two sections consisting of twelve questions in total.

Before I start with the interview questions, I would like to ask you if your data can be used for this research. Your data will be anonymized so that any confidential data is not publicly shared. I would also like to ask you for your permission to record this interview for transcription purposes.

(After receiving informed consent)

Thank you! Now I will start with the recording and the interview questions.

3. Interview Questions: Section 1 – UAM Service Adoption and Nature of Association

1. How would the accessibility of UAM service operations influence your decision to use this service?

(Prompts: Difficulty of purchasing a ticket, difficulty of finding your booked trip at the UAM service location, affordability of a trip)

A. How would your decision be influenced if the service operations possessed more competence than accessibility? And less? Why is this important to you?

(Prompts: Greater ability to perform the service versus the approachability or ease of contact/use of the service – in relation to the first part of question A)

B. How would your decision be influenced if the service operations possessed more courtesy than accessibility? And less? Why is this important to you?

(Prompts: Greater degree of hospitality from service personnel versus the approachability or ease of contact/use of the service – in relation to the first part of question B)

2. How would the credibility of UAM service operations influence your decision to use this service?

(Prompts: Legitimacy of the service, degree of trustworthiness, efficiency and reliability of the operations as told by others)

A. How would your decision be influenced if the service operations possessed more competence than credibility? And less? Why is this important to you?

(Prompts: Greater ability to perform the service versus the degree of trustworthiness in the service – in relation to the first part of question A)

B. How would your decision be influenced if the service operations possessed more courtesy than credibility? And less? Why is this important to you?

(Prompts: Greater degree of hospitality from service personnel versus the degree of trustworthiness in the service – in relation to the first part of question B)

3. How would the security of UAM service operations influence your decision to use this service?

(Prompts: Safety of the operations, the service's usage of data, the risks of using the service)

A. How would your decision be influenced if the service operations possessed more competence than security? And less? Why is this important to you?

(Prompts: Greater ability to perform the service versus the degree of safety from danger or risk throughout the service – in relation to the first part of question A)

B. How would your decision be influenced if the service operations possessed more courtesy than security? And less? Why is this important to you?

(Prompts: Greater degree of hospitality from service personnel versus the degree of safety from danger or risk throughout the service – in relation to the first part of question B)

4. Interview Questions: Section 2 – UAM Service Adoption Part 2

1. How would the comfort and convenience of UAM service operations influence your decision to use this service? And for the service's vehicle designs?

(Prompts: On-demand mobility, usefulness, time savings, comfortable seats/service locations)

2. How would an environmentally and community friendly UAM service influence your decision to use this service?

(Prompts: Sustainability in the operations/vehicle design, type and level of noise emissions, safety of the people on the ground, autonomous technology that can enhance safety through software guidance)

3. How does the purpose of the trip and the vehicle size influence your decision to use UAM services? And the time of day and altitude of the trip?

(Prompts: Inter-city or intra-city travel, short or long trips, willingness to share trips with others, seat capacity, crowding, day/night trip, high/low altitude trip)

5. Interview Closer

This brings us to the end of the interview! Thank you for your responses! I found them very interesting to listen to. If there are any additional comments or ideas you would like to share, then feel free to do so right now. Thank you for your time and I hope you have a great day! Goodbye!

6. Checklist of Factors and Associations for the Interviewer

Factors	Associations
Accessibility	Accessibility vs. Competence
Credibility	Accessibility vs. Courtesy
Security	Credibility vs. Competence
Comfort	Credibility vs. Courtesy
Convenience	Security vs. Competence
Environmentally Friendly	Security vs. Courtesy
Community Friendly	
Trip Purpose	
Size/Dimensions	
Time of Day/Altitude of Trip	

8.2. Coding Scheme of All Processed Results

Type of Interviewee	Example Quote	Description	Open Coding Codes	Axial Coding Categories 1	Axial Coding Categories 2	Selective Coding Core Categories
Low income/high tech savvy frequent public transportation user	<i>"I think that accessibility will greatly affect my decision. If I am going to put UAM services into my routine, then the accessibility needs to be perfect. We are living in an environment where everything needs to work seamlessly."</i>	Customer perceives "access" as a positive factor that is required for seamlessness and service usage.	Expected seamlessness	Access as a promoter	General consensus	Access ranked as #1 in importance
Low income/high tech savvy frequent public transportation user	<i>"If I do a cost/benefit analysis between other modes of transport, I would say that UAM services have to save time in order for me to want to pay the price of a ticket, otherwise it might not be worth it. Also, the price will matter less if taking these vehicles is a necessity, like in a big city such as New York."</i>	Customer perceives "affordability" as a positive factor if the UAM trip saves time or is a necessity.	Time savings and necessity favoring affordability	Access as a promoter	General consensus	Access ranked as #1 in importance
High income/high tech savvy frequent public transportation user	<i>"I'd say accessibility is key. The less I have to prepare the better it will be for me."</i>	Customer perceives "access" as a positive factor when there are less tasks to complete, where the service fully attends to the customer's basic needs.	Minimized preparation	Access as a promoter	General consensus	Access ranked as #1 in importance
Low income/high tech savvy frequent private car user	<i>"Accessibility is very important to me. Usually I take my car everywhere, but last week I took the train to Paris, and I really prefer the easy check-in process that you have on trains rather than at airports for example."</i>	Customer perceives "access" as a key positive factor when the check-in process is quick and easy.	Quick and easy check-in process	Access as a promoter	General consensus	Access ranked as #1 in importance
High income/high tech savvy frequent airline user	<i>"For example, in Brazil it could take 5 hours to get from downtown to the airport whereas you could take a helicopter to get there faster and easier. So, the amount of time to get there and the risk of incorrect timing are important to me."</i>	Customer perceives "access" as a positive factor because of time savings.	Time savings advantage	Access as a promoter	General consensus	Access ranked as #1 in importance
High income/high tech savvy frequent	<i>"Price is not that important to me because I am willing to pay for a service that gets me where I need to go and that reduces the time it takes to get there."</i>	Customer perceives "affordability" as an inconsequential factor when time is saved, and the destination is accurately reached.	Insignificance of price	Access as a promoter	General consensus	Access ranked as #1 in importance

airline user						
Low income/high tech savvy frequent airline user	<i>"Regarding the European market, we would have a good UAM service. So, for me the accessibility would be necessary because I am using many modes of transport, but usually airplanes, which means that I need to get to my destination very easily."</i>	Customer perceives "access" as a key positive factor when it makes the ride very easy to use.	Expected seamlessness	Access as a promoter	General consensus	Access ranked as #1 in importance
High income/high tech savvy frequent airline user	<i>"Intermodal movement between, for example, the landing pad and the metro would be really important to me. You know, you just want it all to be seamless. I would definitely pay more to land at an UAM airport that is very near to other modes of transport instead of having to walk for like 15 minutes to where I need to go after I land."</i>	Customer values "access" and seamlessness above all else, to the extent that "affordability" becomes insignificant.	Expected seamlessness and willingness to pay	Access as a promoter	General consensus	Access ranked as #1 in importance
Low income/high tech savvy frequent public transportation user	<i>"If I hear from friends and other people that they are really liking the service and that it is being very efficient then I'm like, "Sign me up!"."</i>	Customer perceives "credibility" as a positive factor when receiving news from others about their positive experiences with the service.	Positive experiences	Credibility as a promoter	Individual consensus	Credibility ranked as #3 in importance
High income/high tech savvy frequent public transportation user	<i>"I would say that credibility is necessary in order for the service to even have the guts to come on the market."</i>	Customer perceives "credibility" as a positive factor since it is expected that the service will be legitimate if it is on the market.	Expected credibility	Credibility as a promoter	Individual consensus	Credibility ranked as #3 in importance
Low income/high tech savvy frequent private car user	<i>"Reputation is everything, as a service operator you would have to prove that you are equally reliable in comparison to other modes of transport."</i>	Customer perceives "credibility" as a positive factor when a good reputation is demonstrated by service operators.	Need for reputation	Credibility as a promoter/barrier	General consensus	Credibility ranked as #3 in importance
Low income/high tech savvy frequent airline user	<i>"Credibility greatly influences my decision. If something happens up in the air, then the chances of survival are much lower, so the reputation of the service needs to be at a high level."</i>	Customer perceives "credibility" as a positive and negative factor depending on the level of credibility of the service.	Required high level of reputation	Credibility as a promoter/barrier	General consensus	Credibility ranked as #3 in importance
High income/high	<i>"I would need the service to be more credible than Tesla since they have had</i>	Customer requires "credibility" that	Need for evidence			Credibility ranked as #3

igh tech savvy frequent private car user	<i>many incidents with self-driving technology."</i>	proves functionality.		Credibility as a promoter/barrier	General consensus	in importance
Low income/h igh tech savvy frequent public transportation user	<i>"I don't care if they use my data. Nowadays everyone is using everyone's data. So, if the service can sell and use my data to improve their operations and lower their prices then I'm perfectly fine with that."</i>	Customer perceives "security" as a positive factor when data is being used for service improvements and price reductions.	Positive data usage	Security as a promoter	Individual consensus	Security ranked as #4 in importance
Low income/h igh tech savvy frequent private car user	<i>"As long as they comply with data laws, like in Europe for example, I don't see why they can't use my data."</i>	Customer perceives "security" as a positive factor when data laws are followed.	Law-abiding data usage	Security as a promoter	Individual consensus	Security ranked as #4 in importance
High income/h igh tech savvy frequent private car user	<i>"I'm not so concerned about data usage. I'm more concerned about the security of the operations, specifically when I'm in the vehicle rather than at the airport. If it's my body, safety would be number 1."</i>	Customer perceives "security" as an inconsequential factor since data usage is insignificant. It is a negative factor if vehicle safety is not ensured in contrast to airport safety.	Trip safety over data usage	Security as a barrier/inconsequential	General consensus	Security ranked as #4 in importance
High income/h igh tech savvy frequent airline user	<i>"I expect everyone's data to be abused already by other companies. For travel data, they could trace me back to my routes but not much more. I wouldn't really worry about it."</i>	Customer perceives "security" as an inconsequential factor since data usage and abuse are very widespread already.	Insignificance of data usage	Inconsequential security	General consensus	Security ranked as #4 in importance
Low income/h igh tech savvy frequent airline user	<i>"I don't care about the usage of my data. Most big tech companies, like Amazon or Facebook, use our data already so I don't see the point in caring about it."</i>	Customer perceives "security" as an inconsequential factor in relation to data usage.	Insignificance of data usage	Inconsequential security	General consensus	Security ranked as #4 in importance
Low income/h igh tech savvy frequent public transportation user	<i>"If the trip saves me time and the vehicle will always be there when I need it then I am going to love the service. But if these things become difficult then that's not going to work for me."</i>	Customer perceives "convenience" as a positive factor in relation to time savings and availability. However, it is a key negative factor if "convenience" is absent.	Required convenience	Convenience as a promoter/barrier	Individual consensus	Competence ranked as #2 in importance
Low income/h	<i>"It would depend on the distance. I don't necessarily like</i>	Customer perceives "convenience" as being highly				Competence ranked as #2

High tech savvy frequent private car user	<i>taking the plane because of the hassle at airports. So, I would definitely prefer to use this service for short trips because of the on-demand factor."</i>	beneficial due to the on-demand mobility, in contrast with commercial airports.	Preference for on-demand mobility	Convenience as a promoter	Individual consensus	in importance
High income/high tech savvy frequent public transportation user	<i>"It depends, if I travel from the Hague to Amsterdam for work then I would like some comfort and I would pay for that. But if I am traveling for leisure then I would probably care less about paying for comfort."</i>	Customer perceives "affordability", in relation to comfort, as a necessary factor when traveling for work. In contrast, it is an inconsequential factor when traveling for leisure.	Necessary and optional comfort purchase	Courtesy over access	Individual consensus	Courtesy ranked as #5 in importance
High income/high tech savvy frequent public transportation user	<i>"If I could, I would travel by train to get to other cities or countries because I really dislike the hassle at airports before I can even fly. So, I want it to be easy to get to my trip."</i>	Customer values "access" over "competence" because it avoids hassles at the airport.	Hassle avoidance	Access over competence	General consensus	Access ranked as #1 in importance
Low income/high tech savvy frequent private car user	<i>"Since UAM services are probably going to start with those who have much higher income, I'd say that the competence factor might be more for them in terms of how spacious it is in the vehicle. But right now, for me, the money is a greater factor than being able to pay for the competence of the service."</i>	Customer values "access" over "competence" due to cost concerns and a low income.	Cost concerns in relation to additional luxuries	Access over competence	General consensus	Access ranked as #1 in importance
High income/high tech savvy frequent airline user	<i>"The level of service, where they are very competent, doesn't really matter to me as long as I can easily use my phone to buy a ticket or find my vehicle for example."</i>	Customer values "access" over "competence" due to a preference for ease of use.	Ease of use advantage	Access over competence	General consensus	Access ranked as #1 in importance
High income/high tech savvy frequent public transportation user	<i>"I prefer it to be easy to locate my vehicle and the airport rather than receiving good hospitality. I travel well on my own and don't need someone welcoming me. I could care less."</i>	Customer values "access" over "courtesy" because hospitality is unnecessary due to self-independence.	Unnecessary hospitality	Access over courtesy	General consensus	Access ranked as #1 in importance
Low income/high tech savvy frequent public transportation user	<i>"For example, with Uber, you just want the ride to get you easily from spot A to spot B instead of having a very friendly Uber driver that brings you to the wrong location, because then you are still annoyed."</i>	Customer values "access" over "courtesy" since getting easily from point A to B is of utmost importance.	Effortless ride between point A-B	Access over courtesy	General consensus	Access ranked as #1 in importance

Low income/high tech savvy frequent public transportation user	<i>"I am a student, so my level of income is not so high, which makes hospitality more of a luxury for me than a need."</i>	Customer values "access" over "courtesy" since low income impacts the need for hospitality.	Hospitality as a luxury	Access over courtesy	General consensus	Access ranked as #1 in importance
Low income/high tech savvy frequent private car user	<i>"Maybe at a later stage in my life, if I had the money, I would pay for courtesy but, like I said, I rather choose accessibility over courtesy."</i>	Customer values "access" over "courtesy" due to cost concerns and a low income reducing the need for hospitality.	Hospitality as a luxury	Access over courtesy	General consensus	Access ranked as #1 in importance
High income/high tech savvy frequent airline user	<i>"I don't really care about the level of hospitality. A bottle of water is fine for me for a short or long flight. Just make it easy to use with an app."</i>	Customer values "access" over "courtesy" due to hospitality being inconsequential.	Insignificance of hospitality	Access over courtesy	General consensus	Access ranked as #1 in importance
Low income/high tech savvy frequent airline user	<i>"When I take flights for work, I prefer to have flight attendants providing everything I need in order to save time and get work done. But when I take personal flights, I rather look for cheaper flights than have more comfort."</i>	Customer values "courtesy" over "access" during business flights, but values "access" over "courtesy" when searching for personal flights in relation to being more affordable.	Business trip and comfort versus personal trip and affordability	Access on par with courtesy	Individual consensus	Access ranked as #1 in importance
High income/high tech savvy frequent public transportation user	<i>"I would look at the probability. Even though some planes have fallen out of the sky, for example with Boeing, you still travel reasonably safe in airplanes. If you compare the amount of accidents with the amount of miles traveled, then it's actually safer to fly than step in a car."</i>	Customer perceives "credibility", in relation to safety, as an inconsequential factor due to the higher probability of having a safe flight, regardless of past accidents.	High probability of safety due to competence	Competence over credibility	Individual consensus	Competence ranked as #2 in importance
Low income/high tech savvy frequent public transportation user	<i>"If there is a problem and I contact customer service and they can help me solve the problem immediately, then I'm fine with using the service still, even if the problem damages their credibility. But if I am left hanging there then I don't want to use the service again."</i>	Customer values "competence" over "credibility" when the customer service is always available to solve issues despite a reduction in credibility.	Responsive customer service	Competence over credibility	Individual consensus	Competence ranked as #2 in importance
		Customer perceives "security" as a				

High income/high tech savvy frequent public transportation user	<i>"The more commercialized and the bigger the service is at the airport and in the vehicle, makes me feel less comfortable."</i>	negative factor when mass commercialization occurs due to it producing large crowds.	Dislike for crowds	Security as a barrier	General consensus	Security ranked as #4 in importance
High income/high tech savvy frequent airline user	<i>"I wouldn't worry about the safety at the airport. I would worry about if they maintain their vehicles and are they safe to be in from a flight perspective not a security perspective."</i>	Customer perceives "security" as an inconsequential when examining the airport and vehicle security. But it is a negative factor because of the perceived worry surrounding vehicle maintenance and flight success.	Perceived worry of vehicle maintenance and flight success	Security as a barrier	General consensus	Security ranked as #4 in importance
Low income/high tech savvy frequent private car user	<i>"Honestly, as long as the service makes sure that the right people are supposed to be on a flight and that no one has any weapons or hazardous items, just like on a normal commercial flight, then that is good enough in terms of security for me."</i>	Customer perceives "security" as a negative factor when the service doesn't follow the same security guidelines as commercial flights.	Need for commercial flight security guidelines	Security as a barrier	General consensus	Security ranked as #4 in importance
Low income/high tech savvy frequent airline user	<i>"Well, I won't be the first person using UAM services. I am a person of credibility and evidence. I need to see that the service works properly. Perhaps more risk-taking people would try it out initially, but I'd say I am between a risk-taker and a risk-averse person. I need to see that it works for 1-2 years first with other people."</i>	Customer perceives "security" as a negative factor if safety cannot be proven or hasn't been tested by enough people yet.	Need for safety evidence	Security as a barrier	General consensus	Security ranked as #4 in importance
High income/high tech savvy frequent public transportation user	<i>"Private working has really changed my view on traveling, where I used to travel every day from the Hague to Amsterdam. But now with hybrid working, I really enjoy the ride by looking out the window instead of doing work. So, it's a break for me."</i>	Customer perceives "convenience" as an inconsequential factor because taking a ride is a break rather than doing more work to save time.	Insignificance of time savings	Inconsequential convenience	Individual consensus	Competence ranked as #2 in importance
High income/high tech savvy frequent public transportation user	<i>"Certainly positive. Any alternative to fossil fuel for traveling is something that I would support."</i>	Customer perceives "environmentally friendly" as a key positive factor that is preferred.	Pro-sustainability	Environmentally friendly as a promoter	General consensus	Credibility ranked as #3 in importance

Low income/high tech savvy frequent public transportation user	<i>"It would influence my decision greatly. I think we are currently in a world where everyone needs to do their part in contributing towards sustainability, otherwise we are going to face major problems. I would definitely prefer an all-electric vehicle."</i>	Customer perceives "environmentally friendly" as a key positive factor that needs to be implemented for greater service usage and acceptance.	Pro-sustainability	Environmentally friendly as a promoter	General consensus	Credibility ranked as #3 in importance
Low income/high tech savvy frequent private car user	<i>"Well, if you look at buses, they carry many people on the ground, whereas cars are more for personal use. I see these UAM vehicles being more like cars. So, since many of these vehicles are going to be launched into the sky, there needs to be sustainability on mass because otherwise it's just going to add to the current environmental problems, which I wouldn't want to see happen."</i>	Customer perceives "environmentally friendly" as a key positive factor because of environmental concerns in relation to the large number of UAM vehicles that will be operating in the future.	Pro-sustainability	Environmentally friendly as a promoter	General consensus	Credibility ranked as #3 in importance
High income/high tech savvy frequent airline user	<i>"Climate and GHG emissions are very serious issues right now. I would pay more for a service that does something to counter this rather than a service that doesn't."</i>	Customer perceives "environmentally friendly" as a key positive factor that makes price insignificant.	Pro-sustainability and value of money	Environmentally friendly as a promoter	General consensus	Credibility ranked as #3 in importance
Low income/high tech savvy frequent airline user	<i>"I think that an environmentally friendly service is necessary. If you are not doing your part for society even though there is this climate crisis going on, I think you shouldn't be operating as a service."</i>	Customer perceives "environmentally friendly" as a key positive factor that would greatly influence the brand image of a service.	Pro-sustainability	Environmentally friendly as a promoter	General consensus	Credibility ranked as #3 in importance
High income/high tech savvy frequent private car user	<i>"I drive a gas car, if I felt strongly about it, I would have bought an electric car already. So, it's not so critical to me. But I guess by the time these vehicles are up and running, they will all be fully electric anyways."</i>	Customer perceives "environmentally friendly" as an inconsequential factor, where vehicles are expected to be electric anyways due to technological developments.	Neutral-sustainability	Inconsequential environmentally friendly	Individual consensus	Credibility ranked as #3 in importance
High income/high tech savvy frequent public transportation user	<i>"Well, that would depend on the quality of my noise cancelling headphones. If I can't hear it, then I don't really mind how loud the vehicle is."</i>	Customer perceives "community friendly" as an inconsequential factor as long as it is not possible to hear noise emissions through the use of noise cancelling headphones.	Insignificance of noise emissions	Inconsequential community friendly	General consensus	Credibility ranked as #3 in importance

High income/high tech savvy frequent airline user	<i>"As long as its not in my backyard! Noise emissions and being environmentally friendly are community trade-offs. One can reduce or increase the other. But I imagine that these vehicles will be moving from landing pad to landing pad, not to my backyard! So, it doesn't really bother me what kind of noise comes from the vehicle."</i>	Customer perceives "community friendly" as an inconsequential factor as long as the UAM vehicle doesn't go near the customer's home.	Isolation of noise emissions to landing pads and routes	Inconsequential community friendly	General consensus	Credibility ranked as #3 in importance
Low income/high tech savvy frequent airline user	<i>"In general, we have so much aviation going on, and sure people complain about the noise, but I don't think it really matters to be honest. If the vehicle is really loud then maybe the airports should be a bit outside the city so that less people are bothered, but if it's not that loud then that's great for flying into the city."</i>	Customer perceives "community friendly" as an inconsequential factor, however, there is a preference, but not a necessity, for low noise emissions.	Insignificance of noise emissions	Inconsequential community friendly	General consensus	Credibility ranked as #3 in importance
High income/high tech savvy frequent public transportation user	<i>"I would expect that in 15-20 years, the technology is sufficiently developed, and that everyone is using these services because of that. So, that would make it feel normal to me."</i>	Customer perceives "community friendly" as a positive factor since autonomous technology is expected to be fully developed, once released.	Expected functionality of autonomous technology	Community friendly as a promoter	General consensus	Credibility ranked as #3 in importance
Low income/high tech savvy frequent public transportation user	<i>"I would prefer a very silent vehicle of course. Also, the service needs to consider the timeslots at which vehicles fly. If its 4am in Amsterdam, then you can't have a very loud vehicle flying around the city since people will get really mad."</i>	Customer perceives "community friendly" as a positive factor when noise emissions are reduced. However, it is a negative factor when flight times are late at night and the vehicle is very loud.	Reduced noise emissions	Community friendly as a promoter/barrier	Individual consensus	Credibility ranked as #3 in importance
Low income/high tech savvy frequent public transportation user	<i>"At first, I would prefer a pilot because if something goes wrong and you are flying really high, then that is a serious thing. But let's see, maybe in 10-15 years when people are using autonomous technology much more, then I will probably be fine with it. I need to see the evidence of this first."</i>	Customer perceives "community friendly" as a positive factor when there is enough evidence of autonomous technology functionality. However, it is a negative factor in the present-day, where there isn't enough evidence yet.	Mixed autonomous technology preference	Community friendly as a promoter/barrier	Individual consensus	Credibility ranked as #3 in importance
	<i>"I think that for most of the flying, autonomous would be good. I think that we</i>					

<p>Low income/high tech savvy frequent private car user</p>	<p><i>have the technology for it. Probably for most people, having a pilot there, just in case, would provide a sense of relief. I think a hybrid approach is best, where it flies autonomously for most of the flight but has a trained pilot if necessary. It's kind of how planes work right now, but there would need to be more autonomy because there are going to be many flying vehicles everywhere that need to communicate with each other."</i></p>	<p>Customer perceives "community friendly" as a positive factor when autonomous technology is implemented, alongside a single trained pilot, so that there is a sense of safety.</p>	<p>Preference for autonomous and pilot hybrid approach</p>	<p>Community friendly as a promoter</p>	<p>Individual consensus</p>	<p>Credibility ranked as #3 in importance</p>
<p>Low income/high tech savvy frequent private car user</p>	<p><i>"I think that you need to look at the regulations and infrastructure that are needed for these vehicles. If there are designated airways, then the vehicles should stay there and not bother people beyond the infrastructure limits."</i></p>	<p>Customer perceives "community friendly" as an inconsequential factor due to infrastructure for isolating noise emissions to.</p>	<p>Isolation of noise emissions to designated infrastructure</p>	<p>Inconsequential community friendly</p>	<p>General consensus</p>	<p>Credibility ranked as #3 in importance</p>
<p>High income/high tech savvy frequent airline user</p>	<p><i>"I would be very comfortable with autonomous as long as I see evidence first. But I trust the technology will be developed enough by that time to be credible enough to use. Also, I would much rather use autonomous flying vehicles than autonomous vehicles on the ground surface since there are less factors in the air to consider, and I would have no need for a pilot if I used autonomous flying vehicles."</i></p>	<p>Customer perceives "community friendly" as a key positive factor if autonomous technology is used in UAM vehicles. However, evidence is needed before usage.</p>	<p>Strong preference for autonomous technology and required evidence</p>	<p>Community friendly as a promoter</p>	<p>General consensus</p>	<p>Credibility ranked as #3 in importance</p>
<p>Low income/high tech savvy frequent airline user</p>	<p><i>"I just need to see the evidence that it works first. But I would probably use autonomous technology because usually robotic automations are much safer than human behavior."</i></p>	<p>Customer perceives "community friendly" as a positive factor when evidence is provided of autonomous technology. However, there is a preference for autonomous technology due to the perceived risks of human behavior.</p>	<p>Preference for autonomous technology with evidence</p>	<p>Community friendly as a promoter</p>	<p>General consensus</p>	<p>Credibility ranked as #3 in importance</p>
<p>High income/high tech savvy frequent private car user</p>	<p><i>"I'm not really concerned with the noise emissions. I'd be more concerned about the possibility of a vehicle crash landing in a playground or hitting a pylon because then the repercussions are much greater."</i></p>	<p>Customer perceives "community friendly" as a positive factor due to not being concerned with noise emissions. However, it is a negative factor due to the risk of harming people on the ground.</p>	<p>Insignificance of noise emissions and concern for safety of the people on the ground</p>	<p>Community friendly as a promoter/barrier</p>	<p>Individual/General consensus</p>	<p>Credibility ranked as #3 in importance</p>

High income/high tech savvy frequent public transportation user	<i>"In the Netherlands, it would be from city to city because I don't think the cities are big enough to fly them within the city."</i>	Customer perceives "trip purpose" as a positive factor when the service is being used for inter-city travel due to the small size of cities in the Netherlands.	Preference for inter-city travel	Trip purpose as a promoter	General consensus	Competence ranked as #2 in importance
Low income/high tech savvy frequent public transportation user	<i>"If I were to go from the Netherlands to Austria then I think I would just take a normal plane. But if the vehicle can take me from Amsterdam to Utrecht, then I would be there so fast, that would be great! Also, if there was an emergency to get to another city, then I really wouldn't mind paying a little extra to get there fast."</i>	Customer perceives "trip purpose" as a positive factor when taking UAM vehicles between cities due to time savings.	Preference for inter-city travel	Trip purpose as a promoter	Individual consensus	Competence ranked as #2 in importance
Low income/high tech savvy frequent private car user	<i>"Inter-city or intra-city seem really great to me. Sometimes there are problems on the road or with train tracks, so in the air you don't have these problems. Within Europe, all the cities are very close to each other so flying from a city in the Netherlands to a city in Germany could be really feasible and cool. Also, I would prefer short trips because the vehicles are much smaller than commercial planes and probably won't have any toilets onboard."</i>	Customer perceives "trip purpose" as a positive factor, for both inter-city and intra-city travel, due to possible ground infrastructure problems and European cities being in close proximity. Short trips are preferred due to perceived absence of toilets.	Preference for short trips and approval of inter-city and intra-city travel	Trip purpose as a promoter/barrier	Individual consensus	Competence ranked as #2 in importance
High income/high tech savvy frequent airline user	<i>"The most important thing to me is that I can skip traffic on the highway when going from city to city. Across the city, well, I would use that a lot if it means that I don't have to go down into a metro. But intra-city travel would compete with any alternative modes of transport because all I care about is getting from A to B in the most convenient way possible."</i>	Customer perceives "trip purpose" as a positive factor when inter-city and intra-city travel save time and avoid traffic in comparison with other modes of transportation.	Preference for inter-city and intra-city travel through time savings and traffic avoidance	Trip purpose as a promoter	General consensus	Competence ranked as #2 in importance
Low income/high tech savvy frequent airline user	<i>"Whether the trip is short or long, inter-city or intra-city, doesn't matter to me. Just take me to where I need to go."</i>	Customer perceives "trip purpose" as an inconsequential factor as long as the destination is arrived at.	Insignificance of trip duration and route	Inconsequential trip purpose	General consensus	Competence ranked as #2 in importance
		Customer perceives "trip purpose" as an				

High income/high tech savvy frequent private car user	<i>"I guess I would mainly use it for inter-city, however, initially I would probably use it for intra-city due to the range capabilities, which is simply a matter of where the technology is initially heading."</i>	inconsequential factor because inter-city and intra-city travel would both be used.	No preference for trip purpose	Inconsequential trip purpose	General consensus	Competence ranked as #2 in importance
High income/high tech savvy frequent public transportation user	<i>"I would say that smaller is preferable. Having 5 people in the vehicle is good enough for me. At least be under 12 people because I read an article, which stated that optimal group conversation comes from having less than 12 people in a closed space because it creates unity."</i>	Customer perceives "size/dimensions" as a positive factor when the number of people inside the vehicle is less than twelve, otherwise it will negatively influence the group conversation due to a lack of unity.	Preference for small amount of passengers	Size/dimensions as a promoter/barrier	Individual consensus	Security ranked as #4 in importance
Low income/high tech savvy frequent public transportation user	<i>"The vehicle size and number of people inside the vehicle don't matter to me as long as I can get from point A to B. I also want to be assured that everyone inside is supposed to be there instead of there being random people without a ticket onboard."</i>	Customer perceives "size/dimensions" as a positive factor as long as the vehicle gets from point A to B with passengers that are supposed to be there.	Point A-B safely with any vehicle size and number of people	Size/dimensions as a promoter	General consensus	Security ranked as #4 in importance
Low income/high tech savvy frequent private car user	<i>"When I have more income in the future, I am willing to pay a premium for more space inside the vehicle. But right now, that is not so important to me."</i>	Customer perceives "size/dimensions" as an inconsequential factor, where a premium would be paid to receive more space inside of the vehicle. But only if the level of income is higher.	Insignificance of vehicle size due to low income	Inconsequential size/dimensions	General consensus	Security ranked as #4 in importance
High income/high tech savvy frequent airline user	<i>"No more than six people and no more than one stop between me and where I'm going to. I would pay more to make this happen if I took a UAM vehicle. If it's a direct flight from A to B and there is an empty seat, go ahead I don't care, fill the seat. But if I get on and there are 19 stops and I'm person 20, then why am I paying the premium to use this vehicle, I might as well hop in an Uber."</i>	Customer significantly considers the number of stops on the way rather than the "size/dimensions" and the "crowding" of the vehicle.	Minimized stops over vehicle size and crowd	Inconsequential size/dimensions and crowding	General consensus	Security ranked as #4 in importance
Low income/high tech savvy	<i>"I don't care how many people are inside the vehicle, like I said, take me from A to B, whether</i>	Customer perceives "size/dimensions" as an inconsequential factor, where the customer is willing	Insignificance of crowding	Inconsequential size/dimensions	General consensus	Security ranked as #4 in importance

frequent airline user	<i>that be with 10 or 100 people."</i>	to fly with any number of people.				
High income/high tech savvy frequent private car user	<i>"Everyone is selfish, which is why we don't all use buses for example, we want our own agenda and space. So, if there is a traffic jam and I have somewhere to be, I would like to use my car, but it wouldn't be efficient. So, I would take a drone instead. But I prefer that to be with 2-4 other people. More people than that is a security issue to me."</i>	Customer perceives "size/dimensions" as a negative factor if there is too much "crowding" since it would be a security concern and would not provide enough space to be comfortable.	Desire for space and security	Size/dimensions as a barrier	Individual consensus	Security ranked as #4 in importance
High income/high tech savvy frequent public transportation user	<i>"I don't have any preference for the time or altitude of the ride. It would just depend on the length of the trip, but overall, it doesn't really matter to me. I would expect shorter trips to be at a lower altitude, otherwise you will spend more time going up than going forward."</i>	Customer perceives "time of day/altitude of trip" as an inconsequential factor, where shorter trips might be the only factor influencing the altitude of the trip due to logistics.	Preference for any time of day and altitude travel	Inconsequential time of day/altitude of trip	General consensus	Security ranked as #4 in importance
Low income/high tech savvy frequent public transportation user	<i>"I don't care what time of the day I fly at. But I rather fly at a low altitude because being in a flying vehicle makes you quite fragile."</i>	Customer perceives "time of day/altitude of trip" as a positive factor when vehicles are flying at a low altitude because it feels safer, where the time of day is insignificant.	Preference for any time of day and low altitude travel	Time of day/altitude of trip as a promoter	Individual consensus	Security ranked as #4 in importance
Low income/high tech savvy frequent private car user	<i>"I think I would prefer low altitude so that I can see buildings outside of the window. Also, they are probably flying slower than planes, so it gives you the opportunity to watch. Basically, I prefer this because of aesthetics. Also, I don't really care what time of day I fly at."</i>	Customer perceives "time of day/altitude of trip" as a positive factor when there is low altitude travel, where the customer enjoys viewing the aesthetics of the city. Time of day is insignificant.	Preference for low altitude travel and insignificance of time of day	Time of day/altitude of trip as a promoter	Individual consensus	Security ranked as #4 in importance
High income/high tech savvy frequent airline user	<i>"I definitely prefer to fly above the buildings just because I think it's safer. I don't really care about the time of day though, as long as it's safe."</i>	Customer perceives "time of day/altitude of trip" as a positive factor when flying safely at a high altitude and during any time of the day. UAM services only offering low altitude travel makes it a negative factor due to safety concerns.	Preference for high altitude travel and insignificance of time of day	Time of day/altitude of trip as a promoter/barrier	Individual consensus	Security ranked as #4 in importance
	<i>"I don't really care about the time or</i>					

Low income/high tech savvy frequent airline user	<i>altitude of the trip because I just want to be safely and comfortably brought from A to B."</i>	Customer perceives "time of day/altitude of trip" as an inconsequential factor.	Point A-B	Inconsequential time of day/altitude of trip	General consensus	Security ranked as #4 in importance
High income/high tech savvy frequent private car user	<i>"I don't know the answer to that. Night might be safer, but it really doesn't matter to me. I also don't care about the height. I care about the quality of the algorithm that knows where all the pylons and buildings are."</i>	Customer perceives "time of day/altitude of trip" as an inconsequential factor, whereas the algorithm of the vehicle is of more concern.	Concern for algorithm over time and altitude of trip	Inconsequential time of day/altitude of trip	General consensus	Security ranked as #4 in importance
Low income/high tech savvy frequent public transportation user	<i>"For example, you see all of these shared scooters in Amsterdam and the great part of it is that there are always available vehicles that you can essentially take anywhere. Otherwise, people wouldn't use them because they can't depend on them."</i>	Customer values "competence" over "access" since available vehicles are required in order for customers to be able to depend on UAM services.	Required availability and dependability	Competence over access	General consensus	Competence ranked as #2 in importance
Low income/high tech savvy frequent airline user	<i>"Even though a flight might take an hour to get from A to B, I still need to consider the time it takes to get to the airport and wait in line for example. So, if that process could be made more efficient with UAM airports rather than accessible, then I think a lot more people would use the service."</i>	Customer values "competence" over "access" because it is preferable that the UAM airport is more efficient during pre-departure rather than accessible.	Efficiency of UAM airport	Competence over access	General consensus	Competence ranked as #2 in importance
High income/high tech savvy frequent private car user	<i>"The difficulty to find my ride is not so important to me. When I'm deciding to use a service like this, it would be because the alternatives are less convenient. If I have to wait for 1 or 2 hours, or if it's impossible to get to the location due to issues, like in an urban landscape like New York city where it's hard to get across, I would be more tolerant of that."</i>	Customer values "competence" and "convenience" over "access" when comparing the service with alternative modes of transport. "Access" issues can be tolerated.	Need for convenience and tolerance for accessibility issues	Competence over access	General consensus	Competence ranked as #2 in importance
High income/high tech savvy frequent private car user	<i>"It depends on what I am doing. Is it a family vacation or something I could be late to? If it's the latter, then I need availability and punctuality rather than easy ticket purchases."</i>	Customer values "competence" depending on the "trip purpose", where "competence" is overall valued over "access". Urgent matters require "competence".	Need for competence depending on trip purpose	Competence over access	General consensus	Competence ranked as #2 in importance
Low income/h	<i>"There needs to be a big degree of trust in</i>					

High tech savvy frequent public transportation user	<i>the service because otherwise if I keep on getting let down then I am not going to want to use the service anymore."</i>	Customer perceives "credibility" as a negative factor when the service consistently disappoints.	Lack of trust	Credibility as a barrier	Individual consensus	Credibility ranked as #3 in importance
High income/high tech savvy frequent airline user	<i>"Credibility is really important to me. I wouldn't be the first person to use this type of service. I want to see that the service is credible in terms of safety and functionality. However, if there were some problems that occurred on different flights, not too many but some, I would still use the service because I generally believe in technology."</i>	Customer perceives "credibility" as a negative factor when there isn't enough evidence yet. However, a few credibility issues don't influence the decision to use the service.	Belief in technology through evidence	Credibility as a barrier/inconsequential	Individual consensus	Credibility ranked as #3 in importance
Low income/high tech savvy frequent public transportation user	<i>"For me, since I don't have a high level of income, the courtesy shown to me is not very important. If I am buying a car, for example, then I want to make sure that the credibility is there before I buy it."</i>	Customer values "credibility" over "courtesy" so that money is spent wisely on credible services rather than courteous services.	Value of money	Credibility over courtesy	General consensus	Credibility ranked as #3 in importance
High income/high tech savvy frequent airline user	<i>"Sure, it's nice to receive good hospitality but with what we are talking about, I mostly care about availability, dependability and safety. If those are checked, then I could care less if my seat was leather or cloth."</i>	Customer perceives "courtesy" as completely inconsequential, where availability, dependability and safety are of utmost importance.	Complete insignificance of courtesy and comfort of seats	Credibility, competence, security over courtesy	General consensus	Courtesy ranked as #5 in importance
Low income/high tech savvy frequent airline user	<i>"Credibility is more important for me, however, if I know a service has great hospitality than I would still be willing to buy a ticket."</i>	Customer values "credibility" and "courtesy" equally based on what is possible, where credibility is still more influential than courtesy.	Non-required preference for hospitality	Credibility over courtesy	General consensus	Credibility ranked as #3 in importance
Low income/high tech savvy frequent public transportation user	<i>"You can't have a reliable vehicle if you don't feel safe."</i>	Customer values "security" and "competence" equally when deciding to use a vehicle or not.	Required vehicle reliability and safety	Security on par with competence	Individual consensus	Security ranked as #4 in importance
Low income/high tech savvy frequent airline user	<i>"Personally, competence and security are both needed because the service needs to be able to show that they follow flight regulations while also being able to perform their service well."</i>	Customer values "security" and "competence" equally in order for there to be successful service operations.	Required security and competence mix	Security on par with competence	Individual consensus	Security ranked as #4 in importance

Low income/high tech savvy frequent public transportation user	<i>"It depends, if you are going to offer these services to my grandparents then there has to be a lot more hospitality. But for me it doesn't really matter."</i>	"Security" and "courtesy" are valued differently in relation to the age of the customer. Older customers prefer more hospitality while younger customers prefer less.	Varying age group hospitality preferences	Security on par with courtesy	Individual consensus	Courtesy ranked as #5 in importance
Low income/high tech savvy frequent public transportation user	<i>"I rather have it that there is no comfort, it can even be the worst type of seats you have ever seen. The most important thing to me is that the service is accessible, competent, reliable and safe."</i>	Customer perceives "comfort" as a negative factor that is the least important to focus on, where access, competence, and security are far more important.	Insignificance of comfort	Comfort as a barrier	General consensus	Courtesy ranked as #5 in importance
Low income/high tech savvy frequent private car user	<i>"Comparing comfort to price, in general the affordability is most important to me than anything else."</i>	Customer perceives "comfort" as an unnecessary factor due to price being the most important factor.	Lowest price over comfort	Comfort as a barrier	General consensus	Courtesy ranked as #5 in importance
Low income/high tech savvy frequent private car user	<i>"I would say that competence and credibility go hand-in-hand. But as long as there are minimal delays, operates on time, and follows your ticket details, then it should be fine and that is the most important rather than the experience of the trip."</i>	Customer values "credibility" and "competence" equally in relation to punctuality and diligence, where the trip experience is less of a concern.	Punctuality and diligence of operations	Credibility on par with competence	Individual consensus	Credibility ranked as #3 in importance
Low income/high tech savvy frequent airline user	<i>"For me, credibility and competence come hand-in-hand. They both need to be at a high level so that I use the service."</i>	Customer values "credibility" and "competence" equally.	Required high level of credibility and competence	Credibility on par with competence	Individual consensus	Credibility ranked as #3 in importance
Low income/high tech savvy frequent private car user	<i>"If I am exclusively choosing between the two, I'd say I prefer hospitality and feeling welcomed, even if there are some credibility issues, but only a few issues not many. I can deal with a few delays. As long as the service deals with the problems and complies with regulations it should be okay for me."</i>	Customer values "courtesy" over "competence" when there are only a few credibility issues, where the service recognizes and solves the issues.	Insignificance of minor credibility issues	Courtesy over credibility	Individual consensus	Courtesy ranked as #5 in importance
High income/high tech savvy frequent private car user	<i>"On longer flights I am willing to pay a premium for more comfort, I will always make that decision if possible."</i>	Customer is willing to pay for extra "comfort" if trip duration is long.	Need for comfort on long trips	Courtesy over access	Individual consensus	Courtesy ranked as #5 in importance
	<i>"If I compare comfort and convenience, I prefer</i>					

Low income/high tech savvy frequent airline user	<i>to have more comfort because I'm just going from A to B, so I would appreciate some comfort during my travels. I also need comfortable seats because otherwise I can't get work done during the ride in a professional way, and that is costly to me and my productivity."</i>	Customer values "comfort" over "convenience" in order to enjoy the trip more and be productive in a professional manner.	Need for professionalism through comfort	Comfort over convenience	Individual consensus	Courtesy ranked as #5 in importance
Low income/high tech savvy frequent private car user	<i>"I much rather feel safe than being treated nicely and not feel safe."</i>	Customer values "security" over "courtesy" due to safety concerns being more significant.	Hospitality as a luxury	Security over courtesy	General consensus	Courtesy ranked as #5 in importance
Low income/high tech savvy frequent airline user	<i>"Security is definitely more important to me than courtesy. When trains were first used, people were scared of them, but over time the service became more trustworthy because they could prove it was safe. So, a service needs to be able to prove this in order for people to want to use the service."</i>	Customer values "security" over "courtesy" in relation to credibility and a need for evidence.	Preference for security through credibility	Security over courtesy	General consensus	Security ranked as #4 in importance
High income/high tech savvy frequent private car user	<i>"I'm more preoccupied with how the pilot is flying. Like I said, I could have a robot tell me everything instead of a human."</i>	Customer values "security" over "courtesy" since the pilot is of more concern than the level of hospitality.	Need for safe pilots	Security over courtesy	General consensus	Security ranked as #4 in importance
High income/high tech savvy frequent private car user	<i>"I don't even need a human being. It can be all robotic, assuming the technology is mature enough before I put myself in a drone."</i>	Customer does not value "courtesy" at all, where automations are sufficient, given that there is evidence of maturity.	Preference for automation over human being	Inconsequential courtesy	Individual consensus	Courtesy ranked as #5 in importance
Low income/high tech savvy frequent private car user	<i>"I don't really care about the security inside the vehicle. I am more concerned with the competence inside the vehicle, such as pilots being trained and flying in a safe way."</i>	Customer values "competence" over "security" inside the vehicle, where pilots are properly trained.	Trained and safe pilots	Competence over security	Individual consensus	Competence ranked as #2 in importance
High income/high tech savvy frequent airline user	<i>"When I am looking for my trip or booking my trip, I don't really worry about the security at the airport or in the vehicle. I only focus on the efficiency of the flight in relation to how easy it is to book or if a location is easier and faster to get to than another. There might be competition between</i>	Customer values "competence" and "access" over "security" due to a preference for efficiency and ease, especially in terms of the time and distance it takes to get to an airport.	Preference for efficiency and ease of airport location	Competence and access over security	Individual consensus	Security ranked as #4 in importance

	<i>different companies using apps, and then I would just pick the easier one to use or quicker one to get to."</i>					
High income/high tech savvy frequent private car user	<i>"The convenience is critical, and the safety needs to be demonstrated by a more mature business before I am passenger number 5. The price does not matter to me since I run a few businesses already."</i>	Customer values "convenience" and "safety" over "affordability" due to high income and need for business maturity.	Preference for convenience and safety and insignificance of price	Convenience and safety over access	Individual consensus	Competence ranked as #2 in importance
High income/high tech savvy frequent airline user	<i>"I'm paying to go fast not to be comfortable. I'm a utilitarian."</i>	Customer values "convenience" significantly more than "comfort" due to being a utilitarian.	Preference for utility	Comfort as a barrier	General consensus	Courtesy ranked as #5 in importance
High income/high tech savvy frequent private car user	<i>"It doesn't matter how long the flight is, whether it's 1 or 2 hours, I just want to get there safely rather than experience the convenience of the service."</i>	Customer values "security" over "convenience", regardless of trip duration.	Safe arrival	Security over competence	Individual consensus	Security ranked as #4 in importance