EMERGING TECHNOLOGIES: THE INFLUENCE OF MULTI-DIMENSIONAL
LEGITIMACY

by

Kerrie A. Williams

A dissertation submitted to the faculty of
The University of North Carolina at Charlotte
in partial fulfillment of the requirements
for the degree of Doctor of Business Administration

Charlotte

2024

Approved by:

_____
Dr. SungJune Park

_____
Dr. Chandra Subramaniam

_____
Dr. Reginald Silver

_____
Dr. Laura Stanley

ABSTRACT

KERRIE ANN WILLIAMS. Evaluating the influence of legitimacy on consumer adoption of autonomous vehicles in Jacksonville – an extended UTAUT2 model. (Under the direction of DR. SUNGJUNE PARK)

The primary objective of this study is to evaluate the influence of multi-dimensional legitimacy on consumer adoption of autonomous vehicles. This study used a survey to evaluate the results. These findings reflected that legitimacy positively and negatively influences the relationships between UTAUT2 determinants and intention to use. These effects are noted in this study showing the influence of legitimacy on consumer intention to use AV. Legitimacy warrants further investigation.

DEDICATION

I dedicate this dissertation to my amazing daughter and my wonderful husband. None of this would be possible without the love and support you have both shown me throughout this incredible journey. I am so blessed to have you both in my life. I appreciate the grace that you have given me during those long nights reading, researching, and writing. All of your encouragement and cheers along the way has made the completion of this dissertation possible. Thank you!

ACKNOWLEDGEMENT

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

UTAUT – Unified Theory of Acceptance and Use of Technology

TAM – Technology Acceptance Model

AV – Autonomous Vehicles

AI – Artificial Intelligence

PLS-SEM – Partial Least Squares-System Equation Modeling

SPSS - Statistical Package for the Social Sciences

SEM – System Equation Modeling

BMI – Business Model Innovation

GDC – Green Dynamic Capabilities

GI – Green Innovation

CHAPTER 1: INTRODUCTION

1.1 Study Motivation

Recent news articles have discussed the future of automotive technology. There is a "fervid race occurring among various vehicle manufacturers, as each work to scale their autonomous driving solutions" (Stoner, 2023). Autonomous vehicles (AV) are defined as vehicles that travel to a desired point, either by carrying out a previously defined route or by its own decision mechanism, without human intervention (Parker, 2022). AV manufacturers can foresee the demand for this technology and are hurrying to develop their technology to be available for the public market. San Francisco recently deployed robo-taxis and are being met with hostility due to the vehicles not operating as seamlessly as anticipated. In a recent interview, Andrew Hawkins, the transportation editor for The Verge, stated "we have an extremely high tolerance for human-caused chaos, crashes and deaths that occur on the road and an extremely low tolerance for any sort of problems caused by robots" (Carino and Hughes, 2023). "Despite the need for more research and development, AVs are much closer to being widely used than ever" (Malik, 2023). This race is worldwide with governments already stating their projections for public use. "Saudi Arabia aims for 15% of public vehicles to be autonomous by 2030" (Cabral, 2023). Governments and manufacturers are combining resources to build this technology for widespread public and private use. Autonomous vehicles need to gain approval from groups of individuals to acquire public acceptance, to be seen as legitimate, but safety and privacy concerns will need to be addressed. Widespread uncertainty remains as AVs have been introduced to the consumer market (Haboucha et al., 2017).

The concept of legitimacy has puzzled academic scholars for decades. Research in the late 1970s started to explore what it meant to be legitimate (Weber, 1978) and how legitimacy was

gained or lost (Pfeffer and Salancik, 1978). Weber (1978) viewed legitimacy as a social construct opening the door to organizational research while Meyer and Rowan (1977) viewed legitimacy as a resource starting the path within institutional research. The mid 1990s had another wave of legitimacy interest in academic research. Suchman (1995) developed strategies for "gaining, maintaining, and repairing legitimacy" and defined 12 types of legitimacy, bringing attention to legitimacy as a multi-dimensional construct. Scott (1995) rejected the idea that legitimacy was a commodity and posited that legitimacy was a condition of social alignment within the institution in which it functions. The body of knowledge surrounding legitimacy is continually growing due to the nature of the construct. The most current literature has questioned if legitimacy could be gained from being different (Taeuscher et al., 2021), the impacts of legitimacy judgements (Jacquemint and Durand, 2020), and pushing past the legitimacy threshold (Soubliere and Gehman, 2020). While legitimacy has been vastly studied, there has been little research on legitimacy as a multi-dimensional construct and the effects of legitimacy on emerging technologies. Using the lens of legitimacy from the institutional stream of research, the pressures applied to technology acceptance determinants will affect the intention of individuals in various ways. As such, it is important to study legitimacy as a multi-dimensional concept. This study posits that institutional influences are not suitably integrated in traditional technology acceptance models. Based on this research, the quantitative literature is used to develop an integrated model.

1.2 Research Objectives and Questions

To date, there have been no studies using legitimacy as a moderator on any of the relationships within the unified theory of acceptance and use of technology (UTAUT) model. The UTAUT model is a framework used to examine the intention to accept a technology. Outside of technology adoption, there have been studies that have tested different types of legitimacy as a

moderator with successful results (Kim, 2019, Zhang et al., 2023). When legitimacy is not included in the study of adoption, the research doesn't account for the pressures of the environment in which the technology will operate. The transition of conventional vehicles to autonomous vehicles is "dependent on government policies as well as individual behaviors" (Haboucha et al. 2017).

By combining legitimacy with the UTAUT model, this study was able to examine the acceptance of technology within the environment in which it operates. There are many barriers for individuals to use autonomous vehicle technology including the regulatory landscape, the perception of society, and what is generally known about the technology. Legitimacy is a complex construct that has been conceptualized as a property, process, and perception. Multiple subtypes of legitimacy have been evaluated and strategies have been developed for "gaining, maintaining, and repairing legitimacy" (Suchman, 1995). By researching legitimacy as a moderator on relationships between performance expectancy, effort expectancy, and social influence, this study will add to the body of knowledge of emerging technology acceptance and legitimacy as a multi-dimensional construct.

Based on the analysis of the literature, two research questions have arisen that will be discussed in this study:

1. Does legitimacy influence the relationships between the determinants of use behavior and the intention to use autonomous technology?

2. Will normative, cognitive, and regulative institutional pressures capture the essence of multi-dimensional legitimacy of a technology in an environment in which the technology operates?

To address these research questions, early and recent literature was reviewed. Followed by the development of an integrated framework and statistical analysis of the study results.

1.3 Study Significance

The widespread acceptance of autonomous vehicles is on the horizon. Their competitive environment is increasingly influenced by rapid technological advancements, governmental interventions, and increased awareness of the technology. "Autonomous mobility is dependent on artificial intelligence, which is only as good as the data that powers it" (Thompson, 2023). According to the Washington Times, autonomous vehicle technology has gained momentum around the world and automotive regulation needs to be updated. In July of 2022, the European Union established the "Vehicle General Safety Regulation" legal framework which legalizes the use of automated and fully driverless vehicles level 3 and above. Congresswoman Debbie Dingell, of the U.S. House of Representatives, states that "autonomous vehicles are here and every day we do not have a federal framework in place for the safe deployment of AVs, we're risking falling behind the rest of the world" (Lovelace, 2023). A federal legal framework is needed so that vehicles can seamlessly move from state to state.

The National Institution for Standards and Technology has partnered with the U.S. Department of Transportation, industry representatives, and research institutions to develop standards of measurement to evaluate AV feasibility. Artificial intelligence (AI) is already equipped on current vehicles. Many features, such as automatic headlights, braking, and accident avoidance are already powered by AI (Griffor, 2023). The use of AV has the potential to reduce accidents, especially those caused from distracted driving and poor judgements. The use of AI in AV could also lead to better traffic conditions and additional comfort to passengers (Thompson, 2023). The current AI in vehicles is limited to its direct surroundings, i.e. automatic breaking but AI in AV would have the capability to further navigate, i.e. avoid congested roads. The prior vehicle technology that has become standard equipment on new vehicle models was once

innovative and illegitimate. As technology advances, it becomes collectively adopted and the environment to use the technology is upfitted to better serve its users.

The theoretical significance of the study is the integration of legitimacy with adoption theory. This study condenses previously studied constructs as part of multi-dimensional legitimacy. The evaluation of legitimacy as one construct will allow for greater comparisons among research studies that use a single dimension of legitimacy or aspects that are encompassed within legitimacy.

1.4 Organization of the Chapters

Chapter 2 examines early and current literature to examine the interconnectedness of institutional theory and adoption. Multi-dimensional legitimacy is driven by institutional forces that influence individuals intentions to use or adopt a technology. The literature review is used to determine key influences in the determination to use technology and explore the effects of legitimacy on that determination. After the literature review, a model is proposed and hypotheses are developed.

Chapter 3 uses PLS-SEM to identify the influence of legitimacy on the intention to adopt autonomous vehicles. Partial least square-structural equation modeling (PLS-SEM) evaluates complex models by analyzing and interpreting variance. SmartPLS software uses the measurement criteria to evaluate the reliability and validity of each construct and the performance of the model. The model is considered suitable if it meets the respective thresholds for reliability and validity.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The widespread acceptance of emerging technologies has been an area of research interest for many years. Technologies such as autonomous vehicles have been dreamt of for generations but is now on the cusp of feasibility. Autonomous vehicles are capable of driving to a preselected destination without the use of a human driver. The innovation of this technology has rapidly evolved to allow for the vehicle to make decisions based on various road conditions to ensure the safety of the passenger as well as potential pedestrians. The widespread use of this technology could reduce crashes, provide mobility, allow for urban sprawl, and much more (Adnan et al., 2018). By studying this phenomenon, researchers could evaluate the influence of legitimacy on technology use. Legitimacy is defined as "a condition reflecting cultural alignment, normative support, or consonance with relevant rules or laws" (Scott, 1995). Since technology acceptance is an individual decision, legitimacy has not yet been analyzed in this context. Collective acceptance is required for the widespread implementation and use of autonomous vehicles (Yuen et al., 2020). The uniqueness of autonomous vehicles requires a collective of individuals to adopt the technology to maximize the potential benefits. Autonomous vehicles have the potential to provide benefits to consumers and to society at large, including reduced pollution, traffic, and crashes (Gill, 2021; Waldrop, 2015). In order for this technology to become successful, governments need to regulate traffic laws and implement proper infrastructure to facilitate this technology.

Articles were initially analyzed from the ABI/Inform Collection database, a search was ran using the string "Unified Theory of Acceptance and Use of Technology 2" or "UTAUT2" and "Legitimacy," which found 952 results. The search was narrowed to only provide peer reviewed articles which lowered the results to 878. A selection was made to only include scholarly journals

which lowered the results to 874 articles. The search was narrowed to include the date range from 2013 to 2023 and 873 articles remained. The search was further narrowed to only return articles published in English which decreased the number of results to 836. After reviewing the Financial Times 50 and ERIM journal lists, results were selected to only use articles posted in Academy of Strategic Management Journal, Business & Information Systems, Engineering European Journal of Marketing, International Journal of Information Management, and Technological Forecasting and Social Change. There was a total of 23 articles from the aforementioned journals. The remaining articles were read to determine if they pertained to the current study. The total number of articles that have been chosen for synthesis of unified theory of acceptance and use of technology 2 or UTAUT2 and legitimacy was 0. This confirms the gap in the literature between the UTAUT2 model and legitimacy.

A review of the adoption literature indicates that performance expectancy, effort expectancy, and social influence are key factors in adopting a new technology (Goldback et al., 2022; Morrison and Belle, 2020; Smyth et al., 2021). As the technology becomes popular, potential adopters want to know if the technology will benefit them, if the technology will be easy to use, and if respected individuals in their social circles believe they should use the technology (Venkatesh et al., 2012).

Legitimacy is a complex concept and cannot be measured as a single dimensional construct because it loses the multi-dimensional character of legitimacy (Baum and Powell, 1995). The most commonly used legitimacy assessment criteria used by researchers to evaluate legitimacy have been regulative, pragmatic, moral, and cognitive criteria (Diez-Martin et al., 2022; Deephouse et al., 2017). The institutional mechanisms of isomorphic change are normative, coercive, and mimetic (DiMaggio and Powell, 1983). The normative mechanism stems from professionalization,

the coercive mechanism stems from political influence, and the mimetic mechanism stems from customary responses to ambiguity (DiMaggio and Powell, 1983). The three components of an institution are normative, regulative, and cognitive which provide a "distinctive basis for evaluating legitimacy" (Ruef and Scott, 1998; Scott, 1995) using the basis of the three distinctive control mechanisms of isomorphic change. The normative component of institutions is "rules that introduce a prescriptive, evaluative, and obligatory dimension into social life" (Ruef and Scott, 1998; Scott, 1995). The regulatory component of institutions is "explicit regulative processes: rule-setting, monitoring, and sanctioning activities" (Ruef and Scott, 1998; Scott, 1995). The cognitive component of institutions is "rules that specify what types of actors are allowed to exist, what structural features they exhibit, what procedures they can follow, and what meanings are associated with these actions" (Ruef and Scott, 1998).

An organization has regulatory legitimacy when the behaviors of the venture are consistent with applicable rules and regulations implemented by their respective governments (Guo et al., 2014; Zimmerman and Zeitz, 2002). The regulative legitimacy of technology encompasses the seamless integration of new and old laws and regulations surrounding the production, liability, and use of the technology. An organization has cognitive legitimacy when the actions of the venture are judged as desirable because they match preconceived beliefs and generate social value (Bridwell et al., 2012; Suchman, 1995). The technology also has cognitive legitimacy if it is believed to be right for society and generate social value. An organization has normative legitimacy when the behaviors of the venture are consistent with societal expectations and by acting in ways that are deemed appropriate for the industry (Chung et al., 2016). The normative legitimacy of technology entails the judgement of the technology's capabilities as well as the actions that users can perform with the technology.

This study seeks to contribute to the adoption literature by examining empirical data that supports the relationship between legitimacy and adoption. There is little research on the impact of legitimacy on adoption theory. This study uses a specific geographical sample due to the transient population and the infrastructure improvements recently made in the area. To date, there has not been a study that uses a specific sample on adoption research moderated with legitimacy. Broader AV research has used specific samples due to the location's smart technologies (Madfreda et al., 2021), unique driving conditions (Cosh et al., 2017), and population's age (Park and Han, 2023; Souders and Charness, 2016). This research will evaluate the correlation between legitimacy and adoption in this setting. This study will provide a practical contribution to governing officials who may implement infrastructure improvements and alleviate obstacles for the use of AV.

This chapter is organized as follows. First, a review of early and recent adoption literature followed by a review of early and recent legitimacy literature. And lastly, the development of an integrated framework.

2.2 Literature Review

The unified theory of acceptance and use of technology (UTAUT) model has been researched with institutional theory to help explain users' acceptance of technology. Institutional theory lends insight into the environment in which the technology would be used by considering the formal structures in which it would exist and by incorporating the institutionalized practices that are performed within that environment. In the context of AV individual adoption, these pressures can sway the intentions of a potential user of the technology. The institutional forces that encourage structure and cohesive processes are normative, coercive, and mimetic. Mimetic pressure is the chosen and mindful act of mirroring behaviors of those with greater success and superior status (Bozan et al., 2016; DiMaggio and Powell, 1983). Coercive pressure is the

compulsory act of copying behaviors of those who are more powerful (Bozan et al., 2016; DiMaggio and Powell, 1983). Normative pressure is the unconscious act of copying behaviors of those in a large enough group that the behavior becomes the correct way (Bozan et al., 2016; Harcourt et al., 2005; Johnson et al., 2006).

Bozan et al., (2016) studied health IT adoption patterns of the elderly and found that mimetic and coercive pressure had a positive effect on attitude towards adoption. Normative pressure was not found to have a significant impact on attitude. Conversely, Fauzi et al., (2022) studied micro, small, and medium sized enterprises' digitization and found that mimetic, coercive, and normative pressures had significant positive impact attitudes toward digitization acceptance with the main driver being normative pressures.

The next section examines six legitimacy models, and seven adoption models to evaluate the quality of each argument and the progression of prior research.

2.3 Early Legitimacy Research

For decades researchers have been studying legitimacy, applying it to different contexts, developing new ways to measure it, and dissecting the elements that make something legitimate. Legitimacy can be conceptualized as a property, process, or perception. It has been measured with proxy variables (Deephouse and Suchman, 2008), indirectly through signals (Alexiou and Wiggins, 2019; Deeds et al., 2004; Khoury et al., 2013; Pollock and Gulati, 2007; Tornikoski and Newbert, 2007), or inferred through internal stakeholders and secondary users (Alexiou and Wiggins, 2019; Hudson and Okhuysen, 2009; Human and Provan, 2000).

In 1978, Weber equated legitimacy as conformity to laws and social expectations. Parsons (1960) extended Weber's early research and claimed that legitimacy was the congruence with

social norms, formal laws, and values. Dowling and Pfeffer (1975) viewed legitimacy as the strategic behavior of the organization reacting to external perceptions.

Legitimacy was researched by institutional theorists in the late 1970s. Meyer and Rowan (1977) claimed that legitimacy was a resource that provided protection to organizations. If the organization conformed to the environment, then it would be legitimate by association. Zucker (1977) provided experimental evidence that a legitimate authority can affect conformity in social judgements.

When legitimacy is conceptualized as a property it is researched as an operational resource (Suchman, 1995). This resource can be acquired by emergent organizations (Aldrich and Fiol, 1994; Zimmerman and Zeitz, 2002). To become legitimate the organization or object must be viewed as a fit for the external environment. When legitimacy is conceptualized as a process it is researched as a dynamic interactive social construct. This process occurs through multiple social actors with goal-directed efforts (Suddaby et al., 2017). When legitimacy is conceptualized as a perception it is researched as a social judgement. This judgement is from the perception of individuals as a collective within an institution (Suddaby et al., 2017) based on a set of constitutive beliefs (Suchman, 1988). These conceptualizations lead to contradictory empirical results because they fundamentally require different measurements.

The organizational stream of literature has followed Suchman's (1995) notion of legitimacy encompassing three broad types: pragmatic, cognitive, and moral. Pragmatic legitimacy is the ability of the organization to achieve outcomes. Moral legitimacy is the ability of the organization to do what is right in the view of society which closely resembles Scott's (1995) normative legitimacy dimension. Cognitive legitimacy is the organizations' ability to be accepted by the general public.

The institutional stream of literature has followed Meyer and Rowan (1977) and Zucker (1977). In the mid 90s Scott (1995), recognized legitimacy as multi-dimensional and split the construct into the dimensions of cognitive, regulative, and normative. These dimensions were considered stand-alone typologies rather than parts of a single construct. It is useful to differentiate the three components of institutions because they provide the basis for evaluating legitimacy (Scott, 1995). It has been argued that when legitimacy has been researched using a focus of one segment of the construct it misses the multi-dimensional character of legitimacy (Baum and Powell, 1995). Cognitive legitimacy is the ability of the institution to assimilate with the public, which closely resembles Aldrich and Foil's (1994) definition of legitimacy. Regulative legitimacy is the ability of the institution to follow the enforceable rules of the environment, which resembles Weber's (1978) legal legitimacy. Normative legitimacy is the institutions' ability to conform with the culture of the environment.

An autonomous vehicle is a type of vehicle that operates without human involvement by sensing the surrounding environment and following a multitude of preprogrammed algorithms. There is no current standardization for AV including how these vehicles communicate with their surroundings, how the data is stored and shared, or how autonomous decisions are made in real-time by the vehicle. Federal guidance should be made to ensure continuity across state lines and among manufacturers (Fagnant and Kockelman, 2015). Regulative legitimacy will be addressed by having federal guidance signaling legitimacy.

2.4 Recent Legitimacy Research

A framework was developed by Tost (2011), shown in Figure 2.1, was created to better understand how legitimacy judgements are developed and changed over time.
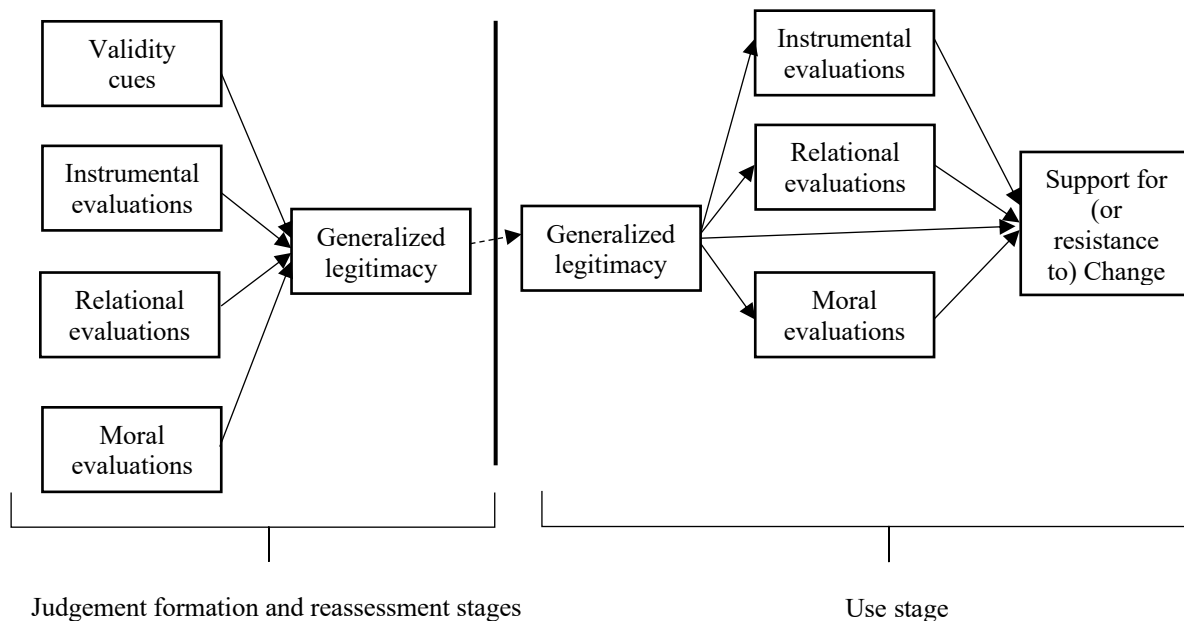
Figure 2.1: Legitimacy Judgement Process (Tost 2011)

This framework uses three dimensions of evaluations; instrumental, rational, and moral. This framework was designed in a way that allows scholars to explore how individual legitimacy judgements contribute to the generalized legitimacy judgements. The two stages of individual judgements are separated by a re-evaluation process after use. The user reconciles their individual judgements with the current social viewpoint.

The Bitektine and Haack (2015) model, shown in Figure 2.2, integrates the macro and micro level legitimacy judgements and the role of social actors. Studies have used legitimacy as a process within the institutional environment to demonstrate the social control that individuals have on their environment (Bitektine and Haack 2015). In this study the authors discuss that conditions of institutional change due to the collective legitimacy judgement being weakened by the presence of competing judgements. This allows microlevel processes of perceptions, judgements, and actions to reshape the social order.
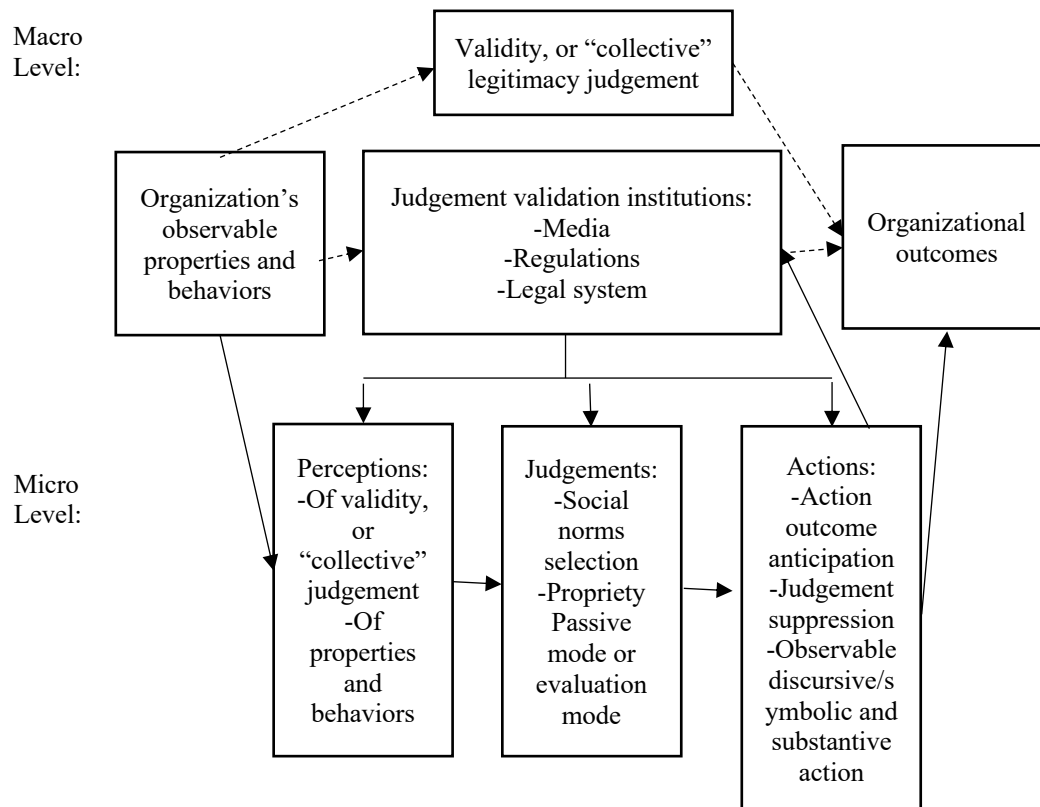
Figure 2.2: A Multilevel Model of Legitimacy Under Conditions of Institutional Stability (Bitektine and Haack, 2015)

According to the model, on a micro level, individuals use observable properties, behaviors, and judgments to create perceptions. Those perceptions are evaluated passively to create an independent judgement. The action that the individual takes is modified by the anticipated reaction others would have to their judgement. On a macro level, the action of expressing a judgement reinforces or challenges a consensus.

The Wu et al., (2019) model, shown in Figure 2.3, combined different types of legitimacy and business model innovation to link the need for legitimacy to establish the ability to conduct business in a new market. Businesses need to adapt in order to survive so they need to continually seek legitimacy from their institutions, customers, and strategic partners. By using a

legitimacy-seeking drive, businesses can mitigate environmental limitations and reduce risk of aversion in an emerging market (Wu et al., 2019).
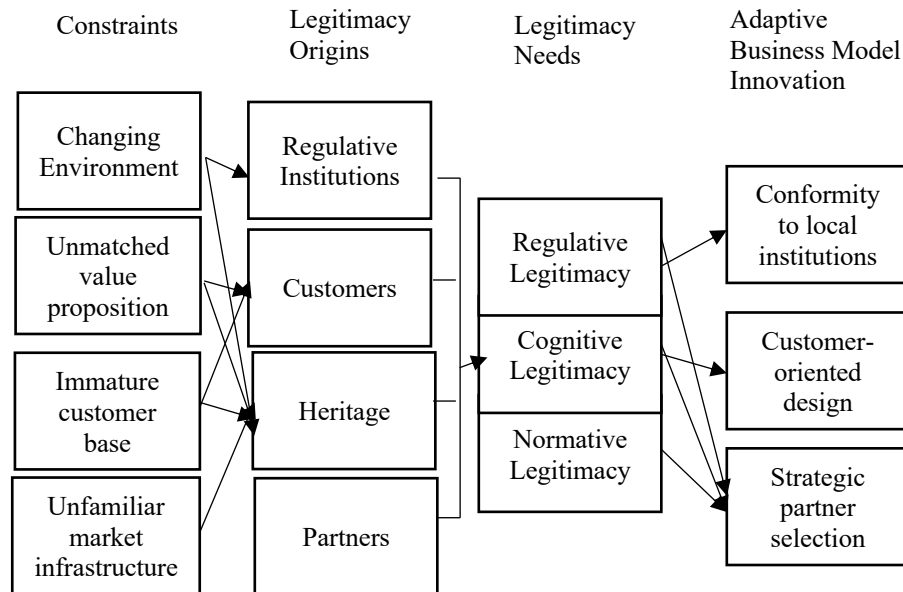
Figure 2.3: Seeking Legitimacy as the Antecedent to Adaptive Business Model Innovation (Wu et al., 2019)

As shown in the model, the constraints of legitimacy origins are a changing environment, unmatched value proposition, immature customer base, and unfamiliar market infrastructure. The legitimacy originates from regulative institutions, customers, heritage, and partners. These origins fulfil legitimacy needs in regulative, cognitive, and normative dimensions. Businesses use these dimensions of legitimacy to adapt their business model innovations to better conform to local institutions, design in customer-orientation, and selection of strategic partners.

The Diez-Martin et al., (2022) model, shown in Figure 2.4, was created to understand how legitimacy assessment criteria is impacted by uncertainty and gender. The study examined the effects of the legitimation criteria on different types of organizational legitimacy.
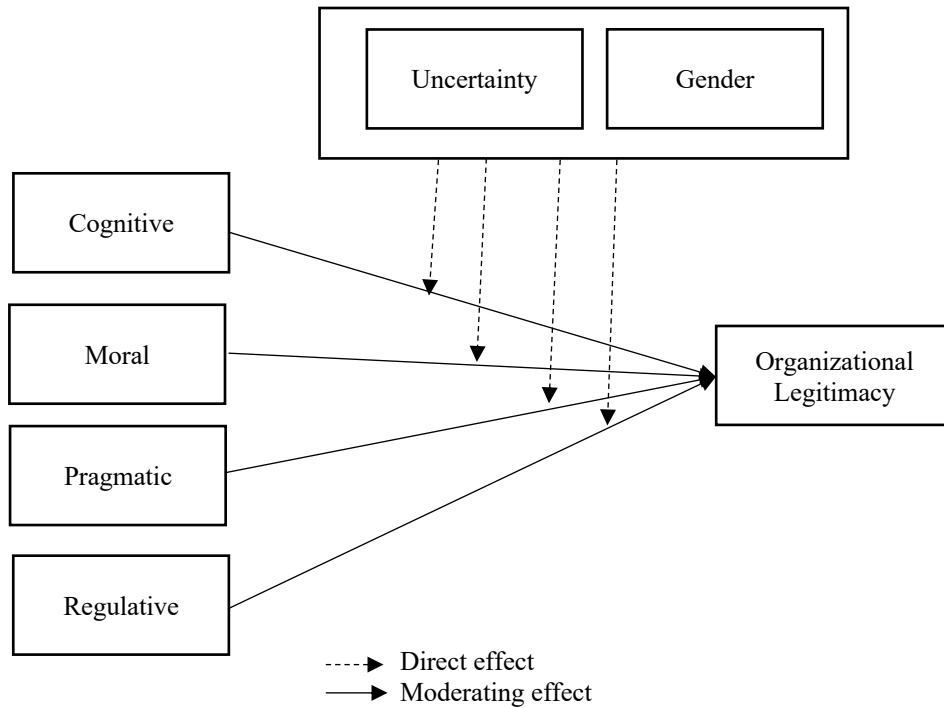
Figure 2.4: Organizational legitimacy perception: Gender and uncertainty as bias for evaluation criteria. Conceptual framework (Diez-Martin et al., 2022)

According to the model, regulative, cognitive, moral, and pragmatic criteria influence organizational legitimacy. Diez-Martin et al., (2022) stated that "these criteria have been widely acknowledged and approved in the literature." These are the most commonly used legitimacy assessment criteria used by researchers to evaluate legitimacy (Deephouse et al., 2017). In this study, the measurements for cognitive, moral, and pragmatic criteria incorporated items from the scale suggested by Alexiou and Wiggins (2019) while the regulatory criterion was measured by the organizations compliance with laws following Chung et al. (2016). The study found that market uncertainty and gender effect the evaluation process of legitimacy using the determinants of pragmatic, moral, cognitive, and regulative criteria. This contributes to the literature that context influences legitimacy. During greater uncertainty, the cognitive criterion was found to exert more

influence on organizational legitimacy and during lower uncertainty, the pragmatic criterion was found to exert more influence on organizational legitimacy.

The Lortie et al., (2022) framework, shown in Figure 2.5, was created to better understand how social influence impacts consumer perceptions and intentions. The study examined the effect of consumer perceptions of legitimacy on purchase intentions and willingness to recommend using businesses that have a social impact model.
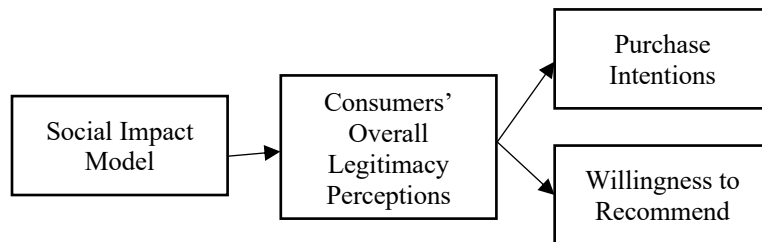
Figure 2.5: The influence of a social impact model on consumers' overall legitimacy perceptions, intentions to buy, and willingness to recommend (Lortie et al., 2022)

According to the framework, the social impact model influences consumers' overall legitimacy perceptions, and those perceptions influence purchase intentions and willingness to recommend. Social impact is the positive outcome of prosocial behavior that benefits the intended targets and the broader community (Lortie et al., 2022; Rawhouser et al., 2019, Stephan et al., 2016). Researchers found a significant positive relationship between having a social impact model and consumers' perceptions of legitimacy. Legitimacy judgements were found to positively influence both purchase intentions and willingness to recommend a venture.

2.5 Legitimacy as a Moderator

Studies have used legitimacy as a moderating variable to determine its effects on various relationships in various contexts. Kim (2019) studied the moderating effects of legitimacy on the relationship between a firm's liability of newness and innovation performance. A firm's liability

of newness is its higher likelihood of failure due to the firm's infancy (Abatecola et al., 2012; Kim, 2019) which lessens as the firm matures. They found that legitimacy had a positive effect on this relationship and also revealed that legitimacy alleviated the negative effect of liability of newness on innovative sales revenue and new product success rates. Tsinopoulos et al., (2018) studied the effects of the motivation to achieve legitimacy on the relationship between co-operation and the likelihood of introducing a new process. They found that as motivation to achieve legitimacy is enhanced the relationship between co-operation and process innovation is strengthened. A principle of institutional theory is that social, cultural, and regulatory bodies impact the legitimacy and existence of an organization by requiring adherence to formal rules, laws, and social normative behaviors of the environment in which the organization operates (Bruton et al., 2010; Kim, 2019).

The Zhang et al., (2023) model, shown in Figure 2.6, was created to better understand the influence of normative, regulative, and cognitive influence on the relationships between novelty and efficiency-based business model innovation and the performance of startups. They examined the influence of different segments of external legitimacy on the performance of startups using two types of business model innovation (BMI) performance drivers.
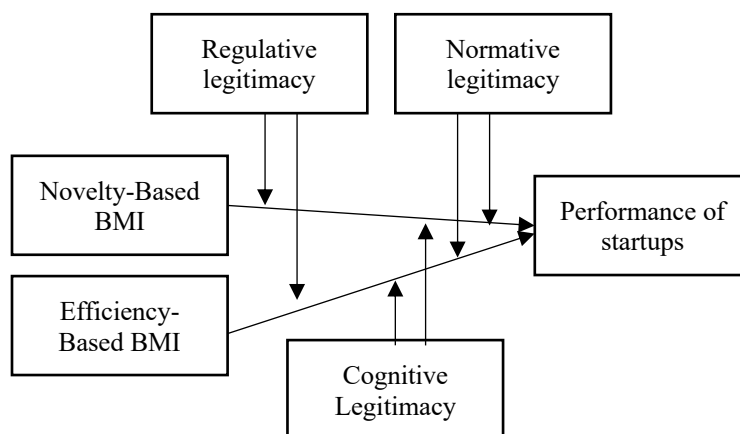
Figure 2.6: Business Model Innovation and Performance of Startups: The Moderating Role of External Legitimacy (Zhang et al., 2023)

According to the model novelty-based and efficiency-based BMI directly influences the performance of startups. These relationships are moderated by external dimensions of legitimacy. Novelty-based activity refers to an organization that adopts new subject matter, framework, and/or governance to obtain an advantage while efficiency-based activity refers to an organization that improves existing processes with the goal of making them more efficient and cost effective (Zhang et al., 2023). Both novelty-based and efficiency-based BMI positively affected the performance of startups. Researchers found that regulative and normative legitimacy negatively influences while cognitive legitimacy positively influences the relationship between novelty-based BMI. Normative legitimacy positively influences the relationship between efficiency-based BMI and performance while regulative and cognitive legitimacy influences were rejected.

Performance expectancy and effort expectancy derived from perceived usefulness and perceived ease of use and as such they are perception based on system characteristics. Social influence is a social process and guiding mechanism. Facilitating conditions are perceptions of resources and structure and hedonic motivation is an individual difference based on the individuals' personality. Legitimacy is not supported in the literature to have the ability to change an individual's personality traits nor perceptions of resources and structure. Therefore, no argument was made to moderate the relationships between facilitating conditions and intention or hedonic motivation and intention.

2.5.1 Performance Expectancy

Previous research has examined the moderating effect of legitimacy on the relationship between capabilities and outcomes. In this example, capabilities are a proxy variable for performance expectancy. Abrudan et al., (2022) studied the motivation to achieve legitimacy as a moderator on the relationship between green dynamic capabilities (GDC) and green innovation

(GI). GDC are organizational capabilities that are driven by environmental performance and GI are organizational activities that minimize environmental damage and aim to use natural resources in a strategic manner. They found that the motivation to achieve legitimacy increases the effectiveness of the relationship between GDC and GI. Reddy (2019) studied the moderating effect of societal legitimacy on the relationship between perceived capabilities and the national start-up rate. This study used entrepreneurial framework conditions of entrepreneurial culture, social image, and capacity to proxy measure pragmatic, moral, and cognitive legitimacy. They found a compensating effect between formal incentives increasing perceived capabilities and higher entrepreneurial activity.

2.5.2 Effort Expectancy

Past research has explored the effect of legitimacy moderating the relationship between effort and intention. Li et al., (2022) studied the moderating effect of national entrepreneurial legitimacy on the relationship between job satisfaction and entrepreneurial intention. In this study, job satisfaction refers to the individual's feelings about their job. This research used the idea of effort within their context for job satisfaction and the employee's willingness to remain in their current position. They found that high entrepreneurial legitimacy combined with high uncertainty avoidance has a significant moderating effect on the relationship between job satisfaction and entrepreneurial intention. Societal uncertainty avoidance refers to the degree of societal rules and regulations placed on unexpected events with the aim of consistency (Li et al., 2022). Beatson and Halloran (2013) found that hierarchy legitimacy moderates the relationship between effort and attribution of intergroup failure where high legitimacy perceptions in high status groups attributed the group failure to a lack of effort by group members. The study concluded that intergroup

attributions are restricted by judgements relating to the legitimacy of the status hierarchy and group status.

2.5.3 Social Influence

Prior research has analyzed the moderating effect of legitimacy between the relationships of social influences and outcomes. Chen et al., (2016) studied the moderating effect of firms' political legitimacy on the relationship between social status and likelihood of employing an outside director as opposed to promoting from within. An outside director, in this study, refers to an employee hired from an overseas market. They found evidence of the effect of political legitimacy on social status was positive and marginally significant. Political legitimacy in this study refers to the degree to which the legal administration views the organization's actions as being in conformity with normative behavior within the environment and formal laws (Chen et al., 2016). This study supports the idea that legitimacy influences social assessments of early adoption decision-making under conditions of ambiguity and that individuals may become early adopters for social benefits.

Hays and Goldstein (2015) found that legitimacy moderates the effect of power on conformity. Power in this relationship refers to the social power given to a person in a position in authority. Prior research has found that power increases behavioral individuality and decreases reliance on situational signals (Hays and Goldstein, 2005; Galinsky, et al., 2008). Legitimacy, status, and reputation have been researched as deriving from fundamentally different sources. According to Deephouse and Suchman (2008), legitimacy reflects adherence to social standards, while reputation reflects self-accomplishment, and status reflects group mobility.

2.6 Early Adoption Research

The TAM model has evolved from when it was first proposed. The model has been developed, modified, extended, and applied across numerous contexts. In a practical context, technology adoption is an important topic because it allows for predictions to be framed and tested to create better use of resources provided for technology consumption. In a theoretical context, the robustness of the technology acceptance models has led to additional determinants being discovered. The model originally sought to focus on design features of information systems because they were thought to be the largest determinant of actual system use. TAM2 was an extension of TAM that included additional constructs to better predict users' behavioral intention to use technology. Similarly, TAM3 was an extension of TAM2, again adding additional constructs to gain a deeper understanding of users' behavioral intention. These evolutions are discussed in further detail later in this paper.

The technology acceptance models receive a lot of criticism for their lack of explanatory value, predictive capabilities, and heuristic nature. Constructs can be removed from the model if they are unnecessary and conversely, added if they are deemed essential. This ability is vital because technologies are everchanging and provide different uses. The criticism around the lack of predictive capabilities is due to these adaptations to the model and the measurements of studies using these models. Measurements are derived from the definitions of the constructs being tested, and these meanings change as they are applied to different contexts or technologies. If a study clearly frames the construct, then the meaning of the construct will be clearly conveyed in the measurement. If the definition is unclear, then the meaning could be lost in translation to the measurement. This creates a gap in the literature by not allowing for comparability of the constructs and leaving the robustness of the technology acceptance models open for criticism.

Theories need to be generalizable so that they can be applied to different settings and further the understanding of a relationship. The theory of reasoned action (Fishbein and Ajzen, 1975), shown in Figure 2.7, proposes that human behavioral intention is affected by subjective norm and attitude. Subjective norm in this context refers to the perception of a behavior which is influence by others.
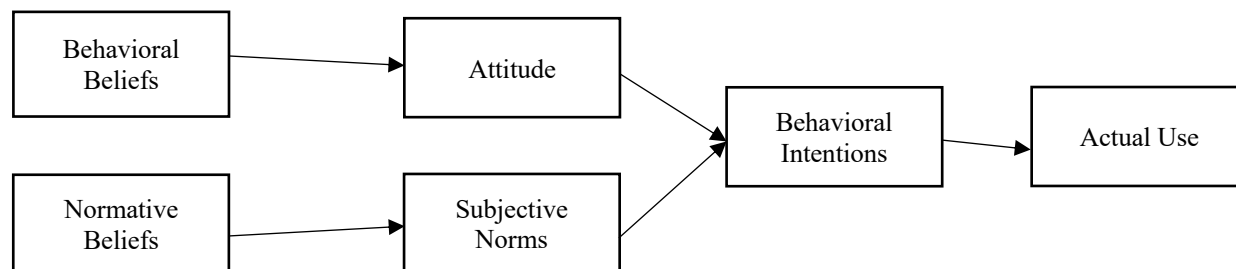
Figure 2.7: Theory of Reasoned Action (Fishbein and Ajzen, 1975)

According to the model, behavioral beliefs have a direct effect on attitude and normative beliefs have a direct effect on subjective norms. Attitude and subjective norms each have direct effects on behavioral intentions. Actual use is fully mediated by behavioral intensions.

Davis (1986) developed the technology adoption model (TAM), shown in Figure 2.8, believing that much of the determination of use stemmed from the perceived usefulness and the perceived ease of use of a technology.
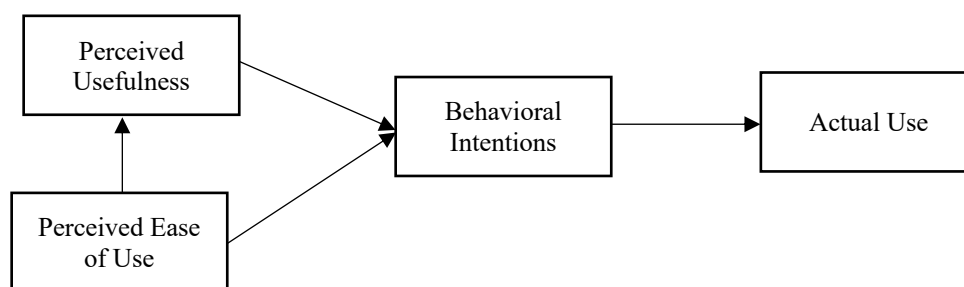
Figure 2.8: Technology Adoption Model (Davis 1986)

According to the model, perceived ease of use directly impacts perceived usefulness and intention to use. Perceived usefulness directly impacts intention to use and mediates the

relationship between perceived ease of use and intention to use. Actual use is fully mediated by intention to use. Davis (1986) defined perceived usefulness as the extent to which a person believes that using a particular technology will enhance the users job performance and perceived ease of use as the degree to which a person believes that using a technology will be free from effort. Davis determined that ease of use influenced perceived usefulness and attitude toward using a technology. Both usefulness and ease of use influenced attitude which affects actual system use.

The technology acceptance model (TAM) is specialized for the use of information systems (Hsiao and Yang, 2011) to determine the behavior of its use. TAM is considered the "most parsimonious and powerful theory in explaining the technology usage behavior" (Venkatesh, 2000; Wu et al., 2011). The TAM has been applied to many different contexts at the organizational and individual level and has proven to be a robust model.

The technology adoption model 2 (Venkatesh and Davis, 2000), shown in Figure 2.9, was created to close the gap on unexplained differences between acceptance and nonacceptance. Additional determinants were added to the original adoption model to accomplish this goal.
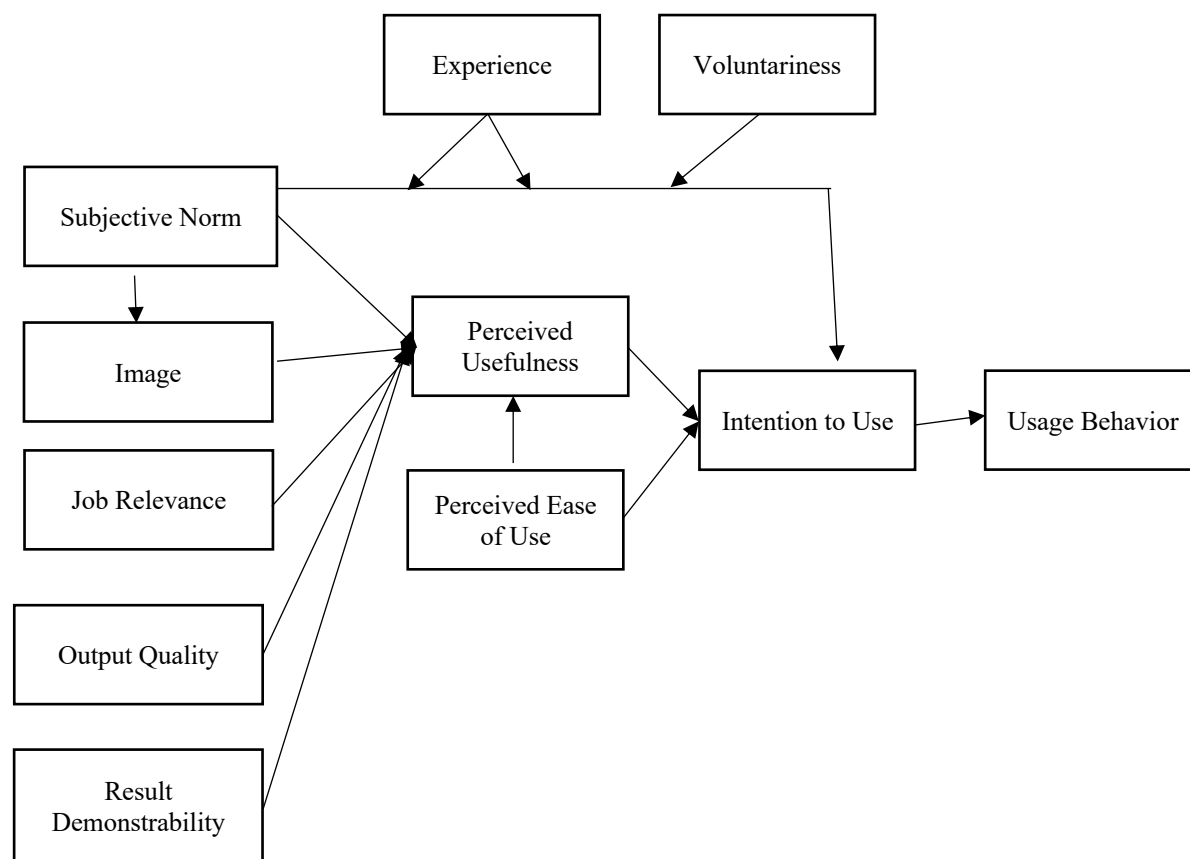
Figure 2.9: Technology Adoption Model 2 (Venkatesh and Davis, 2000)

According to the model, subjective norm, image, job relevance, output quality, and result demonstrability have direct impacts on perceived usefulness. Image partially mediates the relationship between subjective norm and perceived usefulness. Experience and voluntariness moderate the relationship between subjective norm and intention to use. Experience also moderates the relationship between subjective norm and perceived usefulness. This model extends the original adoption model by using TAM as the base. TAM2 incorporates additional constructs that cover social influence processes and cognitive instrumental processes (Venkatesh and Davis, 2000). Social influence processes include voluntariness, subjective norm, and image. Cognitive instrumental processes include job relevance, output quality, result demonstrability and perceived ease of use. Venkatesh and Davis (2000) conducted four longitudinal studies and concluded that subjective norm influenced the user's intention to use and image. Experience and voluntariness moderate the relationship between subjective norm and the intention to use. Experience also

moderated the relationship between subjective norm and perceived usefulness. Image, job relevance, output quality, and result demonstrability were also added to the model and deemed influential to the perceived usefulness of a technology.

The unified theory of acceptance and use of technology (Venkatesh et al., 2003) model, shown in Figure 2.10, was created to better understand technology adoption by creating new constructs to examine the relationships that lead to the use and acceptance of technology.
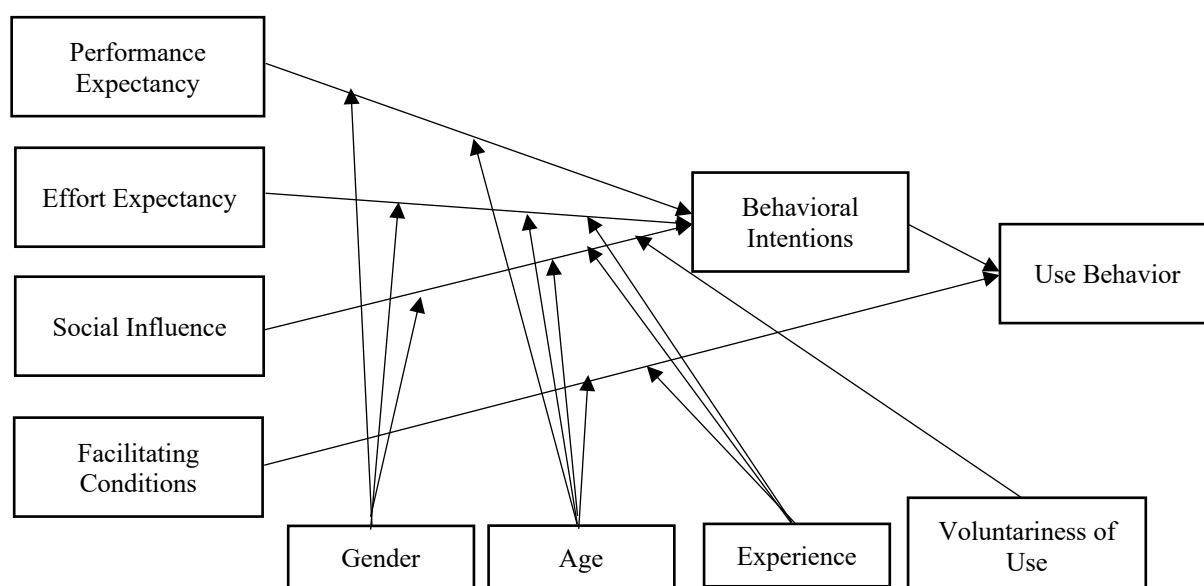
Figure 2.10: Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003)

According to the model performance expectancy, effort expectancy, and social influence directly impacts behavioral intentions. Behavioral intentions and facilitating conditions directly impact use behavior. According to Venkatesh et al., (2003), performance expectancy is defined as the extent to which an individual believes that using the technology will help them to achieve improvements in performance. Effort expectancy is defined as the extent of ease connected with the use of the technology (Venkatesh et al., 2003). Social influence is defined as the extent to which an individual perceives that respected persons believe they should use the new technology

(Venkatesh et al., 2003). And facilitating conditions are defined as the extent to which an individual believes that an administrative and physical infrastructure exists to support use of the technology (Venkatesh et al., 2003). The relationship between performance expectancy and behavioral intentions is mediated by gender and age. The relationship between effort expectancy and behavioral intentions is mediated by gender, age, and experience. The relationship between social influence and behavioral intentions is mediated by gender, age, experience, and voluntariness of use. The relationship between facilitating conditions and use behavior is mediated by age and experience. Behavioral intentions fully mediate the relationships between performance expectancy, effort expectancy, and social influence directly and use behavior.

Prior research has examined individuals' intention to use autonomous vehicles using the unified theory of acceptance and use of technology (Goldback et al., 2022; Morrison and Belle, 2020; Smyth et al., 2021). UTAUT was developed by Venkatesh et al., (2003) to create a parsimonious model to predict users' intention and use of technology. The determinants predicting users' behavioral intention to use a technology are performance expectancy, effort expectancy, social influence, and facilitating conditions.

Prior research has studied legitimacy as a moderator for the relationship between performance and action. Klyver and Thornton (2010) studied cultural legitimacy as a moderator on the relationship between self-efficacy and entrepreneurial action. Self-efficacy refers to the individuals' belief that they will be able to perform the task which is similar to performance expectancy. The entrepreneurial action in this study was operationalized by the participants' intention to start a business. Their study found that self-efficacy can be an antecedent for intention in a supportive environment and the relationship is moderated by cultural legitimacy.

Bandura's (1977) novel idea that the effects of self-efficacy are dependent upon the specific social structure's response to the deliberate action (Klyver and Thornton, 2010). The study showed that a supportive environment lessens the benefits of self-efficacy because they lead to similar benefits. Semerci (2020) found that perceived normative legitimacy moderated the relationship between achievement and growth orientation. In this study, growth orientation refers to an entrepreneur's willingness to grow and focuses on their role in the growth of their business venture. Achievement, in this context, is the entrepreneur's personality trait of desiring to outperform and attain excellence. Entrepreneurial literature has previously linked achievement motivation to entrepreneurial performance as having several positive outcomes.

The technology adoption model 3 (Venkatesh and Bala, 2008), shown in Figure 2.11, was created to better understand technology adoption.
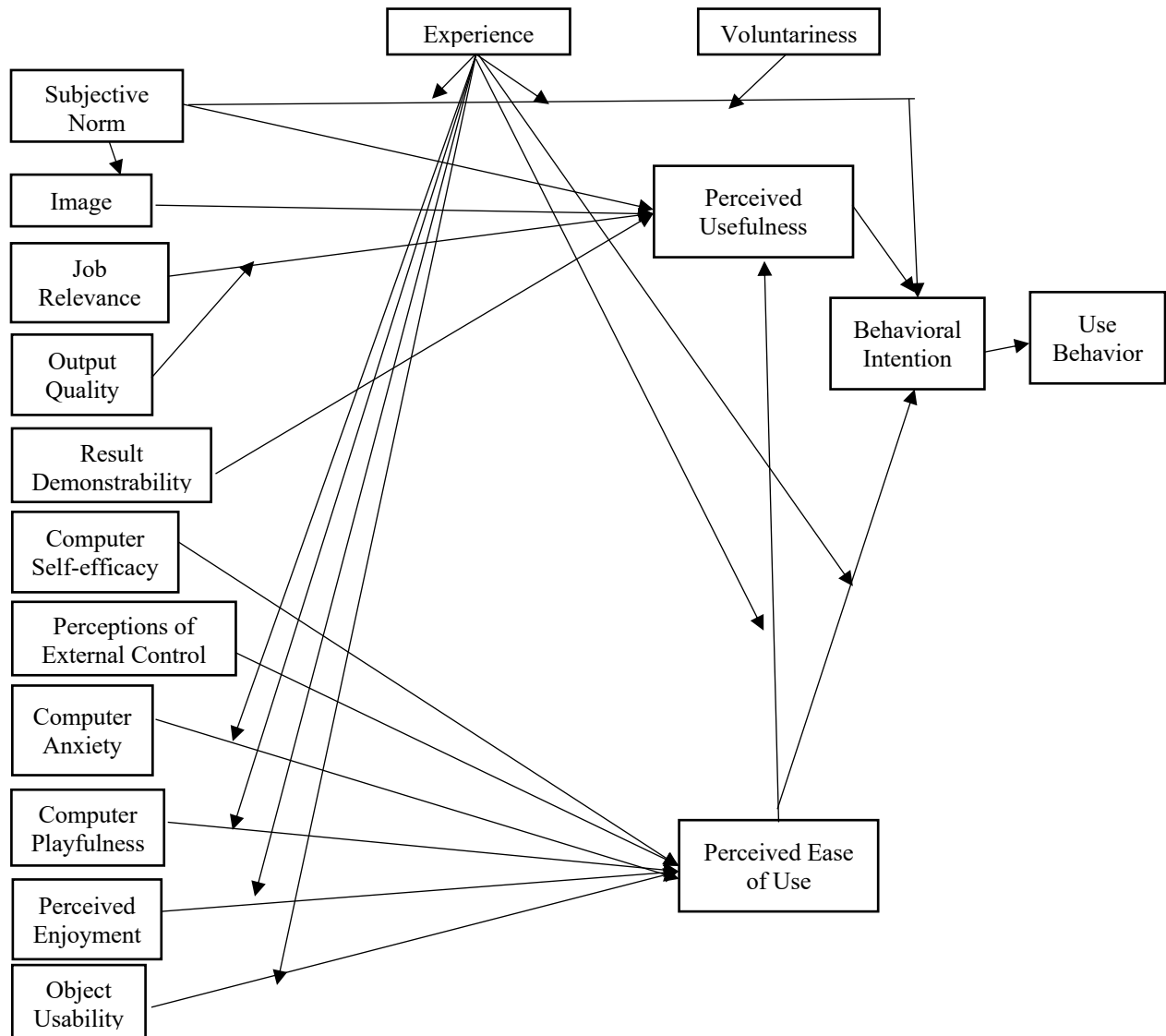
Figure 2.11: Technology Adoption Model 3 (Venkatesh and Bala, 2008)

According to the model, anchors of computer self-efficacy, perceptions of external control, computer anxiety, and computer playfulness directly impact perceived ease of use. Adjustments of perceived enjoyment and objective usability directly impact perceived ease of use. These additional relationships are moderated by experience. The base of the TAM2 model was adjusted to reflect the relationships between perceived ease of use and behavioral intention and perceived ease of use and perceived usefulness to be moderated by experience.

Using TAM2 as the base, TAM3 incorporates additional constructs that anchor and adjust the framing of human decision making (Venkatesh and Bala, 2008). The anchors include computer self-efficacy, perceptions of external control, computer anxiety, and computer playfulness. The adjustments include perceived enjoyment and objective usability. In forming this model, Venkatesh and Bala (2008) realized that experience moderated the relationships between image and perceived usefulness, perceived ease of use and perceived usefulness, and perceived ease of use and the intention to use. The added constructs of computer self-efficacy, perceptions of external control, computer anxiety, computer playfulness, perceived enjoyment, and objective useability were deemed influential to the perceived ease of use of a technology (Venkatesh and Bala, 2008).

The unified theory of acceptance and use of technology 2 (Venkatesh et al., 2012) model, shown in Figure 2.12, was extended from the UTAUT to better understand the acceptance and use of technology.
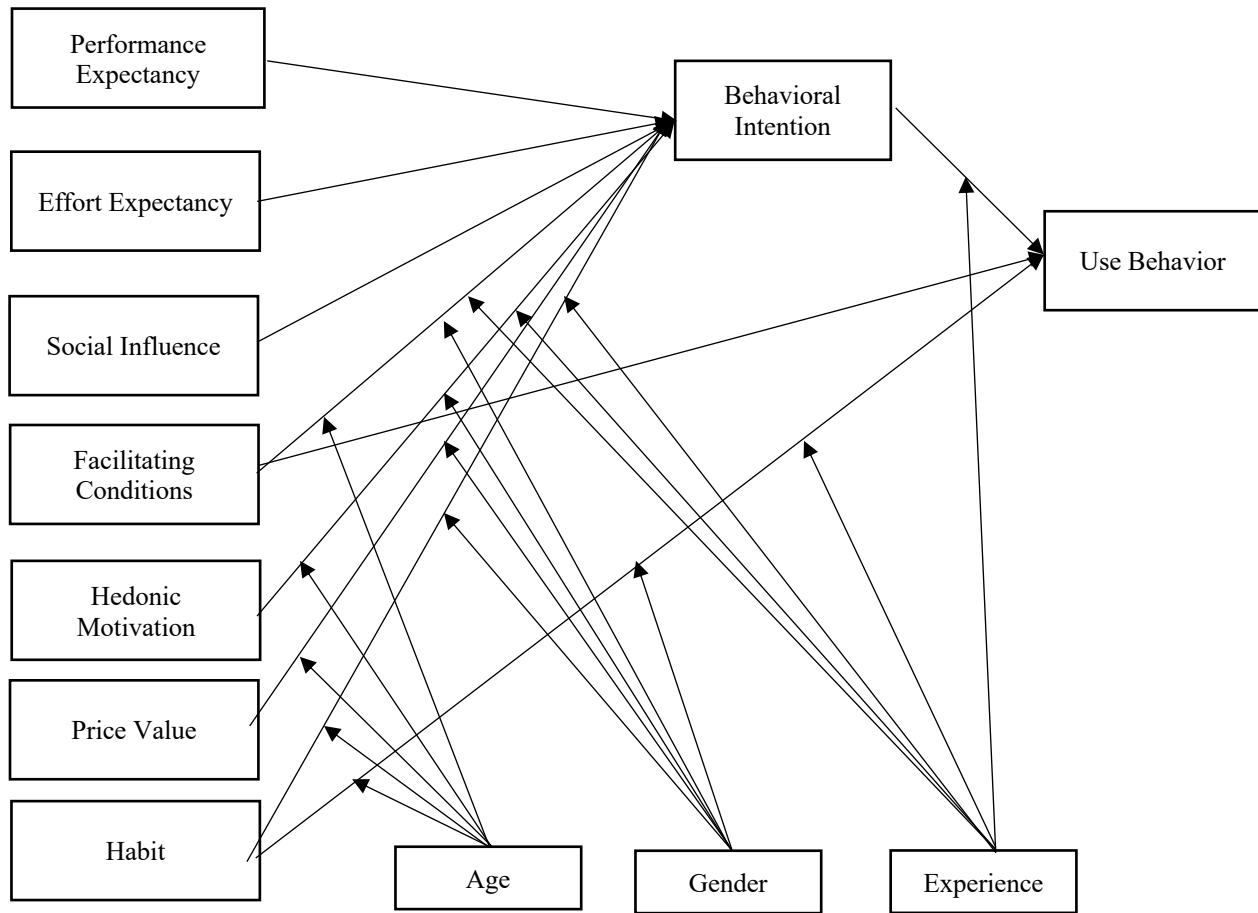
Figure 2.12: Unified Theory of Acceptance and Use of Technology 2 (Venkatesh et al., 2012)

According to the model, facilitating conditions, hedonic motivation, price value, and habit have direct impacts on behavioral intention. The relationships between facilitating conditions, hedonic motivation, habit, and behavioral intention are moderated by age, gender, and experience. The relationship between price value and behavioral intention is moderated by age and gender. Habit has a direct impact on use behavior. This relationship is moderated by age, gender, and experience. The relationship between behavioral intention and use behavior is moderated by experience.

The UTAUT 2 model includes hedonic motivation, price value, and habit to predict behavioral intention. These constructs were examined through research and hedonic motivation

was found to have a significant effect on behavioral intention to use while price value and habit were not.

Price value was found to have an effect on intention when a comparison was present between conventional vehicles and AVs. A study by Haboucha (2017) determined that the price itself was less important than the price comparisons between the two types of vehicles. The study also found that the consumer cost must still be priced effectively to encourage use.

Prior research shows that as organizational behavior is increasingly institutionalized, it may be prone to a dissociation of the individuals' intentions and actions (Klyver and Thornton, 2010; Meyer and Rowan, 1977). This would result in institutional explanations overshadowing the economic explanations (Klyver and Thornton, 2010).

Habit was found to decrease AV adoption in a study by Asgari et al., (2019) supporting the idea that adoption is governed by habits of vehicle usage. The study concluded that the behaviors indicated a "strength of a decision being made based on unconscious habits rather than a reasoned underlying intention" (Asgari et al., 2019).

2.7 Recent Adoption Research

Recent adoption research has evaluated the potential benefits, barriers, and legal implications of widespread autonomous vehicle use (Fagnant, 2015). Studies have used Millennials as the focus group for the adoption of smart city concepts because they are known to be more willing to adopt technology (Manfreda et al., 2021).

The factors influencing the adoption of shared autonomous vehicles (Yuen et al., 2020) model, shown in Figure 2.13, was created to better understand the adoption of autonomous vehicles. The framework combines constructs from the unified theory of acceptance, planned behavior, and adoption models.
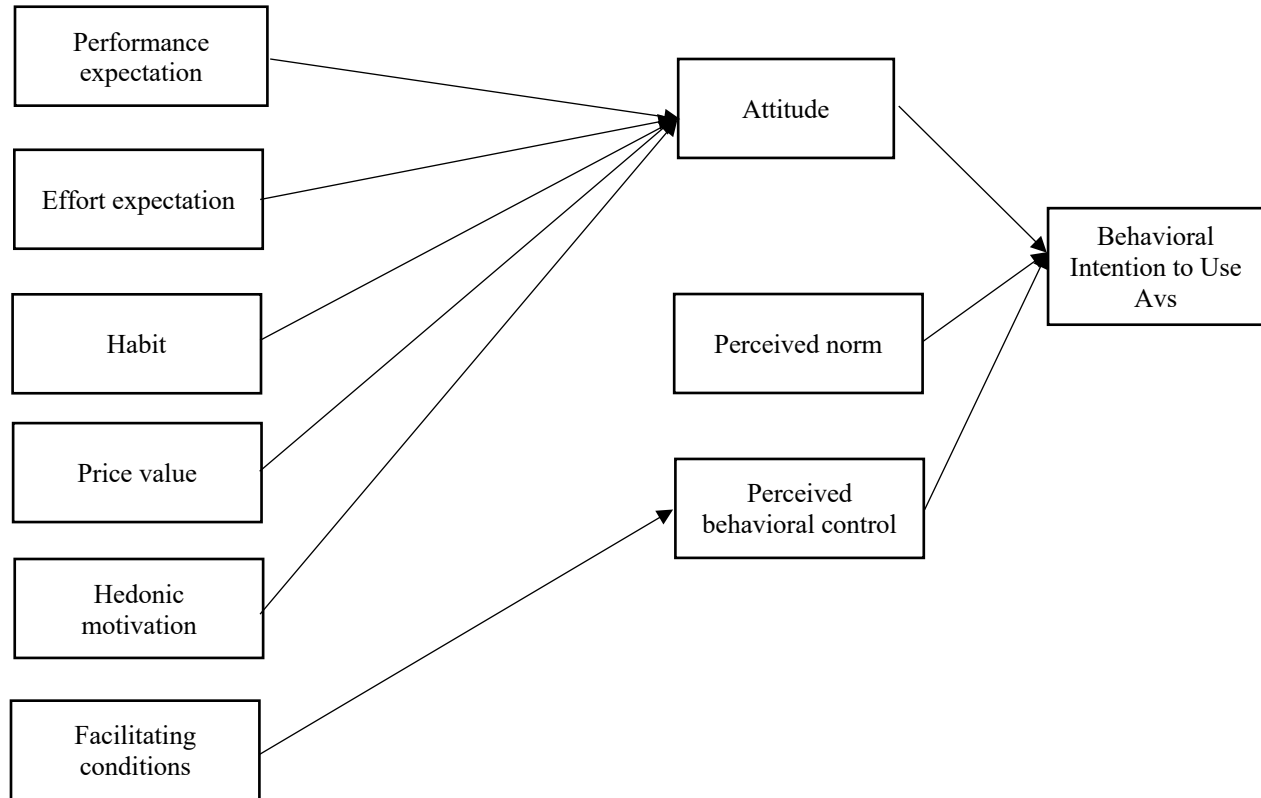
Figure 2.13: Factors Influencing the Adoption of Shared Autonomous Vehicles (Yuen et al., 2020)

According to the model, performance expectation, effort expectation, price value, and hedonic motivation directly impact attitude. Attitude directly impacts behavioral intention to use AV. Facilitating conditions is fully mediated by perceived behavioral control. Perceived behavioral control directly impacts behavioral intention to use AVs.

2.7.1 Performance Expectancy

Performance expectancy plays a key role in the acceptance of autonomous vehicles (Bernhard et al., 2020; Goldbach et al., 2022; Madigan et al., 2017; Morrison and Belle, 2020; Smyth et al., 2021; Yuen et al., 2020). In the study by Kaye et al., (2020), they found that

performance expectancy was the greatest predictor of intentions to use automated cars for residents of Australia and a significant predictor of intentions for residents of France and Sweden.

2.7.2 Effort Expectancy

Effort expectancy has been found to be a determinant of acceptance of autonomous vehicles (Madigan et al., 2017; Morrison and Belle, 2020; Smyth et al., 2021; Yuen et al., 2020). In the study by Goldbach et al., (2022), they found that effort expectancy was not significant if there was an employee present in the driver's seat providing customer service to the riders but was significant if there was no employee present. In the study by Kaye et al., (2020), effort expectancy was not found to be a significant predictor of intentions to use automated cars for residents of Australia but was found to be a significant predictor of intentions for residents of France and Sweden. In the study by Bernhard et al., (2020), effort expectancy was found to be a significant predictor in the first study but not in the second study where additional predictors were being tested.

2.7.3 Social Influence

Social Influence has been found to be a predictor of acceptance of autonomous vehicles (Madigan et al., 2017; Morrison and Belle, 2020; Smyth et al., 2021; Yuen et al., 2020). In the study by Goldbach et al., (2022), they found that social influence was significant if there was an employee present in the driver's seat providing customer service to the riders but was not significant if there was no employee present. In the study by Kaye et al., (2020), social influence was not found to be a significant predictor of intentions to use automated cars for residents of Australia but was found to be a significant predictor of intentions for residents of France and Sweden.

2.7.4 Facilitating Conditions

Park et al., (2021), defined facilitating conditions, in the AV adoption context, as the "level of knowledge and support that a user can attain when using autonomous vehicles." Paul et al., (2015), refined the concept of facilitating conditions, including four parameters: educational content, financial resources, human resources, and infrastructure. Previous research supports the positive relationship between facilitating conditions on technology acceptance under different environments: artificial intelligence (Chatterjee and Bhattacharjee, 2020) AV behavioral intention (Kapser and Abdelrahman, 2020; Madigan et al., 2017; Park et al., 2021).

2.7.5 Hedonic Motivation

Hedonic motivation is defined as "the fun or pleasure derived from using a technology" (Venkatesh et al., 2012) and it has been shown to contribute to the determination of technology acceptance and use (Brown and Venkatesh, 2005). Hedonic motivation has been found to be influential in the AV acceptance context (Kasper and Abdelrahman, 2020; Madigan et al., 2017). In the study by Madigan et al., (2017), hedonic motivation was the strongest predictor of consumer acceptance of automated transport systems.

2.8 Adoption with Legitimacy

Institutional theory has been used to study adoption and use of technology. Krell et al., (2016) studied the impact of legitimacy-based motives on information systems adoption using an institutional theory perspective. The study found that coercive and normative pressures positively influenced management approach while mimetic pressure positively influenced team competence. The management approach involves applying standardized techniques with informal of formal monitoring. The study argues that coercive pressure will influence the management approach because the firm is more restricted by external constraints, so they are more likely to use formal

project management. They also argue that normative pressure will influence the management approach because the firm desires to be associated with norms as defined by associations that the firm operates in, so they are likely to use formal project management. The team competence approach is led by the individual members of the team and embraces their knowledge to complete the project. Mimetic pressure was argued to influence team competence because the firms are motivated by other firms successfully adopting a technology. Since both successful and unsuccessful implementation of technology systems were known, firms would be more likely to use a competent team strategy to attempt the adoption of a new system.

In recent literature, researchers have begun studying the relationships between the three institutional forces and technology use. Normative and mimetic pressure has been found to have a positive significant impact on the behavioral intention (Bozan et al., 2016; Fauzi and Sheng, 2022). In a study by Fauzi and Sheng (2022), they found that normative, mimetic, and coercive pressures significantly influenced attitude and behavioral intention with the most influential factor being normative pressure. In a study by Bozan et al., (2016), they found that mimetic pressure had a stronger influence than normative pressure, but both had positive significant impacts on behavioral intention. This study also found that coercive pressure did not significantly impact behavioral intention but did significantly impact use behavior.

2.8.1 Performance Expectancy

Institutional incentives such as tax reductions, capital allowances, and tax credits have been found to have a positive effect on an organizations production, profitability, and survival (Nwokoye et al., 2023). These incentives are intended to increase the intention to use by relieving financial barriers to use. It is noted in this study this finding partially supports research by Hansen

et al., (2009) and Huong and Cuong (2018) in relation to the impact of tax exemptions being a formal application of potential access to public services.

2.8.2 Effort Expectancy

Regulatory architecture and governance design of the regulatory environment determines the efficiency and legitimacy of any laws that it produces (Erdelyi and Goldsmith, 2018). If the regulative environment is well perceived by the collective than the laws issued will be perceived as efficient and legitimate. The efficiency of a law is how well the law is designed to achieve goals of the society. Laws are intended to signal actions that are expressly permitted or prohibited. The majority of individuals intend to follow the laws of the regulatory environment. If the law no longer suites the needs of the society it becomes inefficient, and to maintain the legitimacy of the regulatory environment, the law will be changed via majority vote. Institutional theory takes into consideration the impacts of pressures generated by regulations on the entity's environment on the intention to adopt technologies (Rodriguez et al., 2022). In the study by Rodriguez et al., (2022), they found a positive relationship between regulatory guidance and perceived ease of use of technology.

2.8.3 Social Influence

An institution is a rule-like social environment with organized patterns of actions (Zucker, 1987). Product ratings are predominantly displayed to communicate consensus information about the reviewer community's product evaluations (Shrihari and Srinivasan, 2012). Influence from a collective, along with situational characteristics, can induce normative conflict which subsequently affects the consumer's behaviors (Shrihari and Srinivasan, 2012). A normative conflict is a situation where multiple plausible rules coexist concerning how one ought to behave in a given set of circumstances (Nikiforakis et al., 2012). In a study by Shrihari and Srinivasan (2012), they

found that the average of the collective consumers' ratings moderated the effect of a reviewer's product experience on the reviewer's product rating.

2.9 Development of a Quantitative Framework

The quantitative framework was developed by reviewing the extensive literature available at the time of this study. In order to create a parsimonious model, constructs were collapsed or eliminated depending on the findings of prior research. A framework was developed to measure the quality of the previously researched variables. Existing research lacks consensus due to the multitude of variables. The number of existing variables creates a barrier in comparing findings. This study will provide evidence to support the argument that existing variables are encompassed in the legitimacy construct.

In summary, the UTAUT model was the most suitable model for this research since it was created to better understand consumer adoption intentions and has the highest explanatory power of competing models. The dimensions of legitimacy that are the most used in research and have a basis in institutional control are regulative, normative, and cognitive and as such have been chosen for this study. The absence of relevant studies in AV adoption incorporating institutional pressures presents a gap in the literature.

2.10 Implications of Findings

This section discusses some implications of conflicting findings reported in the literature review. There are a multitude of variables that have been studied within the technology acceptance models. The determination to use technology is measure the same way regardless of the unique nature of the technology. Researchers are continually modifying or incorporating new constructs in an attempt to attain a better explanatory power than the previous models.

2.11 Development of an Integrated Model

Figure 2.14, shown below, was developed by using quantitative and qualitative research. By combining the unified theory of acceptance and use of a technology with institutional theory a robust model was created. The price value and habit constructs were eliminated from the original UTAUT2 model and three pillars of institutional forces were combined into one.
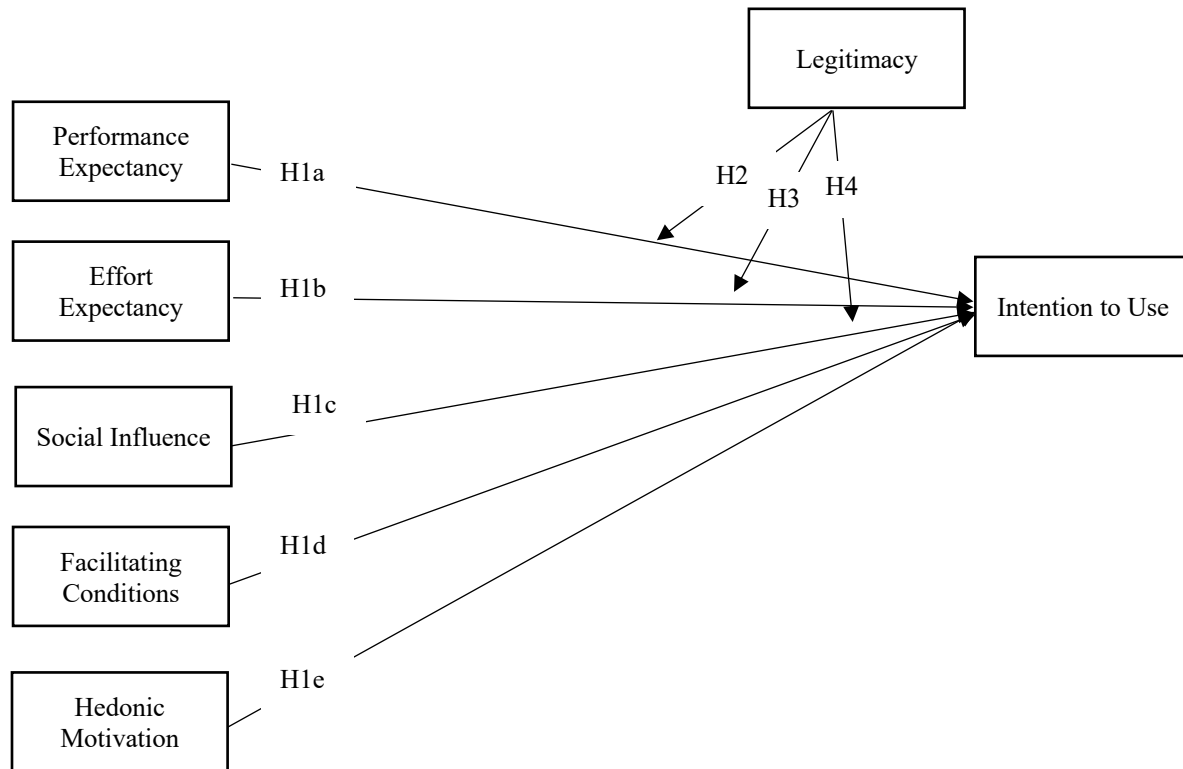
Figure 2.14: Integrated Model of Individual Intention

Previous researchers have concluded that the UTAUT constructs are useful predictors of the acceptance of autonomous vehicles but lack contextual characteristics of the transportation context (Goldbach et al., 2022; Madigan et al., 2016; Nordhoff et al., 2016).

The expected findings of this research are that legitimacy will positively impact the relationships between the UTAUT2 determinants and intention to use and legitimacy, as a multi-

dimensional construct, will capture the essence of the environment in which the technology operates.

2.12 Conclusion

An analysis of the literature has revealed important arguments in the progression of technology adoption research. Through the usage and adoption research, this study will provide insight into individual expectations, motivations, and influences. Through the legitimacy research, this study will provide insight into fundamental influences that impact usage decisions. By combining existing frameworks and using established measures, this research will empirically test and analyze the conceptual framework developed in this chapter.

CHAPTER 3: METHODOLOGY

3.1 Introduction

The goal of this chapter is to describe the methodology used to evaluate the research questions proposed in this study. A key objective of this study is to identify if there is sufficient evidence to support the argument that institutional influences are not suitably integrated in traditional technology acceptance models and that multi-dimensional legitimacy contributes to this gap in the predictability of previous models. The review of the literature indicates that the argument warrants further investigation.

This chapter is organized as follows. First, the models and research questions are reviewed. Second, the development of the hypotheses are explored. Third, a review of existing measures and how the constructs are operationalized.

3.2 Research Model and Research Questions

The primary objective of this research is to understand the impact of legitimacy between adoption antecedents and the adoption of AV. The literature review indicates that current research lacks studies of institutional influences in the technology acceptance models. This study is centered on issues of incomparable research that is due to the multitude of constructs and lack of institutional influences in technology acceptance models. Each technology must merge with the environment in which it operates. The use of legitimacy in this study is a measure of institutional influences. The proposed model fills this gap by adding to the literature a study that incorporates institutional influences in the UTAUT model.

3.3 Research Hypotheses

Autonomous vehicles (AV) need to gain approval from groups of individuals to acquire public acceptance. The attainment of public acceptance is important for the success of all new

technologies but particularly challenging for AV because they must contend with normative, cognitive, and regulatory barriers. AVs require collective individual adoption because the vehicle itself is not a complete product without the infrastructure to support its use. Public acceptance therefore represents a critical precondition for the widespread adoption of AV's.

In the automotive context, performance expectancy is the perceived degree of benefit that the AV will provide the user for the effective and efficient completion of a vehicle journey (Abbasi et al., 2021; Chaveesuk et al. 2023). Individuals desire to complete their journey effectively and efficiently. Other studies have found that performance expectancy positively influences the behavioral intention to use AV (Madigan et al., 2017; Nordhoff et al., 2020). As a result, it is expected that:

H1a: Performance expectancy will positively influence behavioral intention to use.

In the automotive context, effort expectancy is the perceived degree of ease that the AV will entail for the user to operate the technology (Chaveesuk et al. 2023). Individuals' intention to use technology, such as AV, is likely to increase as it involves less effort for the individual to use (Foroughi et al., 2023; Wong et al., 2015). Other studies have found that effort expectancy positively influences the behavioral intention to use AV (Foroughi et al., 2023). As a result, it is expected that:

H1b: Effort expectancy will positively influence behavioral intention to use.

In the automotive context, social influence is the degree of status received by the user's social circle for using AV technology (Chaveesuk et al. 2023). Individuals gauge the opinions of their social circle prior to adopting new technologies and are less likely to adopt if those opinions are unfavorable (He et al., 2022; Foroughi et al., 2023). Other studies have found that social

influence positively influences the behavioral intention to use AV (Madigan et al., 2017; Nordhoff et al., 2020). As a result, it is expected that:

H1c: Social influence will positively influence behavioral intention to use.

In the automotive context, facilitating conditions are the degree of perceived resources and assistance accessible to the user for activities relating to the operation of the technology (Chaveesuk et al. 2023; Foroughi et al., 2023). Individuals could be persuaded to use AV technology if they had the necessary resources, support, and knowledge (Foroughi et al., 2023; Upadhyay et al., 2022). Other studies have found that facilitating conditions positively influences the behavioral intention to use AV (Madigan et al., 2017). As a result, it is expected that:

H1d: Facilitating conditions will positively influence behavioral intention to use.

In the automotive context, hedonic motivation is the degree of perceived enjoyment that the user will have by using AV technology (Foroughi et al., 2023). The idea of being chauffeured might induce feelings of enjoyment in an individual who has a long commute (Erskine et al., 2020; Foroughi et al., 2023). Other studies have found that hedonic motivation positively influences the behavioral intention to use AV (Foroughi et al., 2023; Madigan et al., 2017; Nordhoff et al., 2020). As a result, it is expected that:

H1e: Hedonic motivation will positively influence behavioral intention to use.

Legitimacy is a multi-dimensional construct that encompasses cognitive, normative, and regulatory pillars. Regulative, normative, and cognitive elements each provide a basis for legitimacy (Palthe, 2014: Scott, 1995). This paper defines multi-dimensional legitimacy as the ability to assimilate with the society at large, conform to the culture of the people, and adhere to the formal and informal rules of the environment. Specifically, cognitive legitimacy is the

alignment of AV with culture, normative legitimacy is the actions of AV conforming with society and regulatory legitimacy is the actions of AV conforming to existing laws.

Multi-dimensional constructs have been commonly used to incorporate distinct dimensions as a single theoretical construct (Edwards, 2001). The multi-dimensional nature of legitimacy is represented as a higher order construct to encompass the distinct lower order dimensions of cognitive, normative and regulative legitimacy as a single theoretical concept.

Technology adoption theory has highlighted performance expectancy as an essential driver of AV's adoption and proposed that performance expectancy needs to be perceived as providing a benefit to the user in order to acquire influence (Madigan et al., 2017; Nordhoff et al., 2020). Within the consumer context of technology adoption, performance expectancy is defined as the "degree to which using a technology will provide benefits to consumers in performing certain activities" (Venkatesh et al., 2012). Performance expectancy is important because it establishes the level of benefit that the technology will provide to the user (Yuen et al., 2020). Yet, institutional theorists have shown that institutional pressures can sway the influence of individuals (Bozan et al., 2016; Fauzi and Sheng, 2022).

AVs are capable of performing more autonomously than what current legislature allows and what is normatively or cognitively expected. A user may disregard current regulations and expectations and operate the vehicle to its fullest potential. A logical expectation of an individual who assesses these functions as legitimate would desire to use them. Using the logic that laws are voted into legislation by majority vote, when a number of individuals call attention to something that is perceived as unjust the law is evaluated and revised. Societal norms are shifted overtime by gradual change, when a number of individuals have repeated exposure, actions become normalized. And, cultural belief systems shape the way groups of people think and behave, when

a number of individuals alter their travel pattern of how they use a vehicle, societal values are reshaped. Most individuals want to operate within the parameters of the regulatory, normative, and cognitive environments. AVs will provide greater perceived benefits if all features of AV were permitted. As a result, it is expected that:

H2: Higher legitimacy perceptions strengthen the positive relationship between performance expectancy and behavioral intention to use.

Technology adoption theory has emphasized effort expectancy as a fundamental driver of AV's adoption and proposed that effort expectancy needs to be perceived as having an ease of use in order to acquire influence (Foroughi et al., 2023). Within consumer context of technology adoption, effort expectancy is defined as the "degree of ease associated with consumers' use of technology" (Venkatesh et al., 2012). Effort expectancy is important because it establishes the level of usability that the technology will provide for the user (Yuen et al., 2020). Yet, research has shown that institutional pressures can pivot the influence of individuals (Bozan et al., 2016; Fauzi and Sheng, 2022).

AVs are designed to be a hands-free driving option that allows the user to simply ride to their destination. AVs are designed to imitate the appearance of traditional vehicles but operate differently. The impression that both types of vehicles are similar, but one vehicle requires less work by the individual creates a sense of ease associated with this technology. An efficiency strategy from AV enthusiasts is to consider the AV as a mobile office that allows you to begin your workday as soon as you enter the vehicle. It would be inefficient if the user needed to be cognizant of crossing local, state, or federal jurisdictions. This type of reliance requires the belief that automotive manufacturers as well as governing officials have taken due care to meet regulatory standards expected by the user. A logical extension of an individual who concludes that

automated use is legitimate would desire to use them. Using the logic that automated functions are generally associated with ease, less work, and precision most individuals want to use the easier technology among available options. AVs will provide greater ease of use if they are perceived to conform to society, existing laws, and align with culture. As a result, it is expected that:

H3: Higher legitimacy perceptions strengthen the positive relationship between effort expectancy and behavioral intention to use.

Technology adoption theory has highlighted social influence as a central driver of AV's adoption and proposed that social influence needs to achieve sentiment from respected persons within a social circle in order to garner influence (Madigan et al., 2017; Nordhoff et al., 2020). Within consumer context of technology adoption, social influence is defined as the "extent to which consumers perceive that important others believe they should use a particular technology" (Venkatesh et al., 2012). Social influence is important because the more that individuals consider that influential referents believe they should participate in a certain behavior, the more they conform with implementing this behavior (Yuen et al., 2020). Yet, institutional theorists have shown that environmental pressures can alter the influence of individuals (Bozan et al., 2016; Fauzi and Sheng, 2022).

Prior research has shown that social benefits are afforded to early adopters of technology and that legitimacy influences social assessments of adoption under conditions of ambiguity. Using the logic that unspoken social agreements exist among members of society at large, an action that doesn't meet the social expectation will be regulated with social repercussions. Conversely, an action that exceeds the social expectation of society at large will be rewarded. Groups of individuals with the same background will develop similar normative and cognitive views. Individuals tend to adhere to the social rules of the collective that they are a member of and desire

to gain social benefits from that collective. A logical extension of this would be an individual who determines that a greater collective approves of the technology would believe that the technology is legitimate. The underlying argument is that social influence encompasses an individual's inner circle and individuals that they respect, even if they are not personally known to them, but unknown individuals, as a collective, influence the individual using cognitive and normative expectations and social regulations. Therefore, an individual who appraises AV technology as legitimate would desire to use them. As a result, it is expected that:

H4: Higher legitimacy perceptions strengthen the positive relationship between social influence and behavioral intention to use.

Table 3.1: Hypothesized Relationships

Hypothesized Relationships	
H1a	Intention to use is positively associated with performance expectancy
H1b	Intention to use is positively associated with effort expectancy
H1c	Intention to use is positively associated with social influence
H1d	Intention to use is positively associated with facilitating conditions
H1e	Intention to use is positively associated with hedonic motivations
H2	Legitimacy positively moderates the relationship between performance expectancy and the intention to use
H3	Legitimacy positively moderates the relationship between effort expectancy and the intention to use
H4	Legitimacy positively moderates the relationship between social influence and the intention to use

3.4 Measurement of Variables

The unified theory of acceptance and use of technology (UTAUT) has been rigorously tested to provide evidence of external factors that influence an individual's intention to use a technology. In the literature, UTAUT has been used to predict behavioral intention and use of technology across industries with the highest explanation power of intention (nearly 80%) and use

(over 50%) (Alamin et al., 2020). This prediction can be used to develop better technologies to increase an individual's standard of living or help organizations to become more efficient and profitable. The UTAUT model was developed by Venkatesh et al., (2003) using the determinants: performance expectancy, effort expectancy, social influence, and facilitating conditions.

Institutional theory focuses on legitimacy as a central concept for describing the effects that institutional structures have on an entity conforming to those structures. The institutional forces are normative pressure, regulatory pressure, and cognitive pressure. These pillars of institutional theory explain how a phenomenon is legitimized (Guiliani et al., 2023).

The aim of using the UTAUT model with the institutional pressure of legitimacy is to explain how the intention to use a technology on the individual level is intertwined with institutional structure in which the technology would be operated. The relationships between social influence, performance expectancy, effort expectancy, and the intention to use will be moderated by the legitimacy of autonomous vehicles. Performance expectancy will represent the degree of benefit that the technology provides for the individual. Effort expectancy will represent the degree of effort that the individual will have to exert to use the technology. Social influence will represent the degree of influence that an individual's social circle has on their intention to use the technology. These relationships will be moderated by the regulatory, normative, and cognitive pillars of institutional theory. The regulatory pillar will moderate the degree of regulative fit, the normative pillar will moderate the degree of societal fit, and the cognitive pillar will moderate the degree of cultural fit that is perceived by the individual of the technology.

3.4.1 Independent Variables

Behavioral intention was measured using scales adapted from the UTAUT2 model. The survey consists of questions adapted from Venkatesh et al., (2012), which includes four question

items for effort expectancy, four question items for performance expectancy, four question items for social influence, four question items for facilitating conditions, and three question items for hedonic motivation.

In this study, performance expectancy refers to the degree of benefit that is expected by the individual that the technology will provide. Survey questions for performance expectancy were adapted from Venkatesh et al., (2012), which consists of four question items. Each item was measured on a 7-point Likert scale; (1) strongly disagree, (2) disagree, (3) somewhat disagree, (4) neutral, (5) somewhat agree, (6) agree, and (7) strongly agree. The results of these items were aggregated and retained as a single measure.

In this study, effort expectancy refers to how much effort an individual will have to exert to use the technology. Survey questions for effort expectancy were adapted from Venkatesh et al., (2012), which consists of four question items. Each item was measured on a 7-point Likert scale; (1) strongly disagree, (2) disagree, (3) somewhat disagree, (4) neutral, (5) somewhat agree, (6) agree, and (7) strongly agree. The results of these items were aggregated and retained as a single measure.

In this study, social influence refers to the degree of belief that the individual has that members in an individual's social circle want the individual to use the technology. Survey questions for social influence were adapted from Venkatesh et al., (2012), which consists of four question items. Each item was measured on a 7-point Likert scale; (1) strongly disagree, (2) disagree, (3) somewhat disagree, (4) neutral, (5) somewhat agree, (6) agree, and (7) strongly agree. The results of these items were aggregated and retained as a single measure.

In this study, facilitating conditions refers to the degree of support and knowledge that a user can attain to use the technology. Survey questions for facilitating conditions were adapted

from Venkatesh et al., (2012), which consists of four question items. Each item was measured on a 7-point Likert scale; (1) strongly disagree, (2) disagree, (3) somewhat disagree, (4) neutral, (5) somewhat agree, (6) agree, and (7) strongly agree. The results of these items were aggregated and retained as a single measure.

In this study, hedonic motivation refers to the perceived enjoyment from using a technology. Survey questions for hedonic motivation were adapted from Venkatesh et al., (2012), which consists of three question items. Each item was measured on a 7-point Likert scale; (1) strongly disagree, (2) disagree, (3) somewhat disagree, (4) neutral, (5) somewhat agree, (6) agree, and (7) strongly agree. The results of these items were aggregated and retained as a single measure.

3.4.2 Moderator Variable

Legitimacy was measured using three scales that assess different dimensions of legitimacy. The three pillars to legitimacy according to institutional theory are normative, cognitive, and regulatory. These dimensions were aggregated into a single measure because it has been argued that when legitimacy has been researched focusing on one segment, it misses the multi-dimensional character of legitimacy (Baum and Powell, 1995). Alexiou and Wiggins (2019) noted that at the time of their study there had only been "five attempts to measure individual legitimacy perceptions" (Díez-Martín et al., 2013; Elsbach, 1994; Foreman and Whetten, 2002; Humphreys and Latour, 2013; Pollack et al., 2012).

Elsbach (1994) developed a twelve-question scale to measure individual judgements of normative legitimacy. This scale was adapted by Humphreys and Latour (2013) to apply the construct to cultural representations. This study incorporated ten of the twelve question items. Two question items were considered to be duplicate items and therefore not included. Of the ten

question items, two additional question items were removed from the normative dimension and placed with the cognitive and regulative dimensions of legitimacy.

In this study, normative pressure refers to actions that are in line with the existing society. There is a higher degree of consensus among researchers on the measurement of normative legitimacy on the individual level than other dimensions (Humphreys and Latour, 2013). Survey questions for normative legitimacy were adapted from Elsbach (1994), which consists of eight question items. Each item was measured on a 7-point Likert scale; (1) strongly disagree, (2) disagree, (3) somewhat disagree, (4) neutral, (5) somewhat agree, (6) agree, and (7) strongly agree. Cronbach's alpha was computed to assess the reliability of the survey items. The average of the eight survey items, represents a proxy measurement for the normative dimension of legitimacy.

Some researchers believe that cognitive legitimacy should be assessed at the population level while others see it as a construct that transpires and should be assessed at the individual level (Bitektine, 2011; Humphreys and Latour, 2013). Bitektine et al., (2020) developed a four-question scale to measure cognitive legitimacy. One question item from Elsbach (1994) was added to the cognitive dimension measurement scale because it related to the general public's perception of operating practices.

In this study, cognitive legitimacy refers to the knowledge that a culture shares. The three measurement items reveal if the respondent believes that the technology is typical for its industry. Each item was measured on a 7-point Likert scale; (1) strongly disagree, (2) disagree, (3) somewhat disagree, (4) neutral, (5) somewhat agree, (6) agree, and (7) strongly agree. Cronbach's alpha was computed to assess the reliability of the survey items. The average of the five survey items, represents a proxy measurement for the cognitive dimension of legitimacy.

Guo et al., (2013) developed a five-question scale to measure regulatory legitimacy. One question item from Elsbach (1994) was added to the regulative dimension measurement scale because it related to the perception governmental regulation of operating practices.

In this study, regulatory pressure refers to actions that are in line with the existing laws. The six measurement items reveal the sentiment that the respondent believes that the government agrees with the technology. Each item was measured on a 7-point Likert scale; (1) strongly disagree, (2) disagree, (3) somewhat disagree, (4) neutral, (5) somewhat agree, (6) agree, and (7) strongly agree. Cronbach's alpha was computed to assess the reliability of the survey items. The average of the six survey items, represents a proxy measurement for the regulatory dimension of legitimacy.

The dimensions of institutional pressure have been studied as segments of legitimacy i.e. normative legitimacy, cognitive legitimacy, and regulatory legitimacy. This study aims to use institutional pressures as the influencing dimensions of legitimacy as a whole. The different dimensions of legitimacy will moderate the relationships between the UTAUT factors and intention to use by influencing singular aspects of the desire to use the technology. The personal beliefs of the individual will affect the degree of influence that legitimacy will moderate the intention to use by the level of need that the individual has for a technology to be legitimate. This moderation will be reflected by the change in effect that legitimacy has on the focal relationships.

3.4.3 Dependent Variable

Behavioral intention to use is examined by three survey items derived from previous technology use research (see Venkatesh et al., 2003). In this study, behavioral intention to use refers to the users decision to use or not use a technology. The three measurement items capture the essence of intention to use by focusing on the future availability of AV and frequency of the

intention to use the technology. Each item was measured on a 7-point Likert scale; (1) strongly disagree, (2) disagree, (3) somewhat disagree, (4) neutral, (5) somewhat agree, (6) agree, and (7) strongly agree. The results of these items were aggregated and retained as a single measure. Cronbach's alpha was computed to assess the reliability of the survey items. The average of the three survey items, represents a proxy measurement for the behavioral intention to use.

3.4.4 Control Variables

The control variables for this study include gender, age, and experience. Gender, age, and experience have been found to significantly impact adoption and use models (Venkatesh et al., 2003). Gender theory suggests that such men and women are inherently difference and such differences stem from the socialization process and gender roles strengthened the from birth (Venkatesh et al., 2003). Gender was collected as a dichotomous answer of male or female. Age has been theorized to effect technology adoption and use due to life stage differences (Venkatesh et al., 2003). Age was collected on a continuous scale from 18 to 99 then grouped into age categories. Theorists have suggested that experience removes impediments to sustained usage by allowing users to find avenues for support (Venkatesh et al., 2003). Experience was a dichotomous answer of yes or no. Driver's license status was collected due to meaningful differences exist by gender and race in both licensure rates and driving (Shultz and Williams, 2013). License status was collected as a dichotomous answer of yes or no.

3.5 Research Methods

An online survey was used to sample the population of Jacksonville, NC. This study uses this specific geographical sample due to the transient population and the infrastructure improvements recently made in the area. The G*Power analysis using an effect size of 0.15 (Cohen, 1988), with 8 predictors, and a power (1-Beta) of 0.80 (Hair et al., 2014) deems that a

sample size of 109 is acceptable. Using the 10 times rule, the minimum sample size is 80, which is the greater of 10 times the largest number of formative indicators used to measure a single construct or 10 times the largest number of structural paths to a latent variable (Hair et al., 2017). This study collected 178 responses with 175 usable responses. The survey questions are provided in Appendix A.

3.5.1 Sample Population

Recent studies have used specific sampling within the context of AV. The following studies used specific sampling due to a city feature: Berrada (et al., 2020) sampled residents of Palaiseau, France due to the city's growing scientific cluster of research schools and labs. Hinderer (et al., 2018) sampled residents of Buechenbrann, Germany due to the city's lack of infrastructure and its distance to the city's center. Cosh (et al., 2017) sampled Chiang Mai, Thialand due to their unique driving conditions compared to AV pilot areas. Madfreda et al., (2021) sampled residents of Slovenia, aged between 20 and 30, due to the smart city's capability and the willingness of the millennial generation to adopt technology.

The following studies used specific sampling due the age of the population for AV use: Souders and Charness (2016) sampled residents of Florida due to their higher population of residents aged 55 and older. Park and Han (2023) sampled residents of Korea due to their elderly population. Korea is projected to have the largest elderly population by 2050.

The following studies used specific sampling due the experience the citizens had with AV: Piao et al., (2016) sampled La Rochelle, France due to the city's AV bus demonstration. Feys et al., (2020) sampled Brussels Capital Region because they operated autonomous shuttles.

CHAPTER 4: ANALYSIS OF RESULTS

4.1 Introduction

This chapter outlines the analysis used to develop and assess the theoretical model. This chapter is organized as follows. First, the measurement model will be clarified. Second, the hypothesis tests and results will be described. The following chapter discusses the implications of this research as well as directions for future research.

4.2 Procedures

The online survey collected 178 responses. Out of the 178 responses collected, 175 responses were usable. This includes 13 cases within the responses that were missing data. Those cases were examined and were replaced using the mean replacement method.

After the collection of the survey data, it was then imported to excel for review. The data was visually inspected for any missing values. Three rows of data were removed due to multiple missing cases within those rows.

The data was then imported to Statistical Package for the Social Sciences (SPSS) to analyze descriptive statistics and review for outliers. First, the descriptive statistics were reviewed to detect which survey items had missing values. New variables were created to use a mean replacement technique for the missing values. The descriptive statistics were reviewed again to verify the accuracy of the mean replacement.

The control and construct variables were recoded into testable data by transforming names into values. For license status, no was recoded to 0 and yes was recoded to 1. For residency status, no was recoded to 0 and yes was recoded to 1. For gender, male was recoded to 0 and female was recoded to 1. For experience with AV, no was recoded to 0 and yes was recoded to 1. Age was aggregated into 5 categories: (1) for 18-25, (2) for 25-35, (3) for 36-45, (4) for 46-55, and (5) for

56-99. The construct variables were recoded into seven categories: (1) for strongly disagree, (2) for disagree, (3) for somewhat disagree, (4) for neutral, (5) for somewhat agree, (6) for agree, and (7) for strongly agree.

After transforming the data, a reliability analysis of each subscale was completed. By reviewing the scale if item deleted, the output was evaluated to determine if any items that if deleted would improve the Cronbach's Alpha of the scale. All alpha values were above the 0.7 threshold and were retained.

After analyzing the data, a factor analysis was performed. Using the principal components method based on Eigenvalues greater than 1, a direct oblimin rotation was produced to exclude cases listwise, display coefficients sorted by size, and suppressed small coefficients less than 0.325. The loadings for normative legitimacy survey items ranged between -0.4 and -0.5 except for items N4 and N7. These items were removed. To further clarify the measures, items SI4 and PE3 were also removed. It was determined that these survey items were confusing and not able to measure what they were intended to measure. A total of 6 components were produced after clarifying the measures.

After analyzing the descriptive statistics, reliability of the subscales, and the exploratory factor analysis, the original data was imported into SmartPLS. PLS-SEM was used because the algorithm computes the relationships in the model separately which allows for a smaller sample size. All missing values were recoded with a sentinel "-99" to highlight missing values in the data. These items were analyzed and either removed or replaced with the mean of the survey item. The measurement items were also analyzed, and 4 question items were removed to clarify the measures.

The model was built in SmartPLS to reflect the relationships that were theorized. Latent variables were created for performance expectancy, effort expectancy, social influence, facilitating

conditions, hedonic motivation, and behavioral intention. Moderating effect variables were created for regulative legitimacy, normative legitimacy, cognitive legitimacy, age, experience, license status, residency, and gender. The control variables were determined to not have a significant effect, so they were subsequently removed.

An analysis using Smart PLS was performed to examine the indicator reliability to determine if any items need to be removed. All items that have a 0.708 factor loading were retained, items will a lower factor loading may be retained if further analysis indicates that the factor is necessary. One factor loading was below this threshold. FC2 had a factor loading of 0.679. The factor was retained due to decreasing construct reliability if removed.

In reviewing the internal consistency reliability in Smart PLS, all items had a Cronbach's alpha greater than 0.7 and were retained. All constructs met this threshold and were determined to have a strong relationship between the survey items. The discriminant and convergent validity of the model was assessed to determine the variance between indicators. All items with a 0.5 average variance extracted (AVE) were retained. All constructs met this threshold.

This study used a two-stage higher component model analysis to reduce higher order construct variance that is explained by lower order constructs. The first stage was to obtain the latent variable scores for the lower order constructs. The second stage was to create a manifest variable using the latent variable scores. The approach is able to identify significant path relationships that might have been too small or insignificant to detect using other methods.

Using the latent variable approach, the latent variable scores were exported from the PLS-SEM calculation to excel. Three items were created: regulatory legitimacy to legitimacy, normative legitimacy to legitimacy, and cognitive legitimacy to legitimacy. This method is superior to the repeated measure items method because it accounts for nonlinear relationships

between latent variables. The second order construct was created as a reflective-formative higher component model to test the two-layer structure of the constructs and to reduce model complexity by summarizing the lower order components (Hair et al., 2017, p44). Multi-dimensional constructs are formative because each measure captures a different aspect of the construct (Petter et al., 2007).

A PLS-SEM calculation was then performed with the three items that were created using the latent variable scores. The convergent validity was subsequently analyzed. All items were above the 0.5 average variance extracted (AVE) threshold. Multicollinearity was analyzed to determine the collinearity between indicators. All variance inflation factors (VIF) were below the 5.0 threshold. The significance and relevance of the outer weights were analyzed. All items were significant with outer weights between 0.222 and 0.488.

Path coefficients and goodness-of-fit were examined to determine the predictability of the model. Bootstrapping was performed to evaluate the level and significance of the path coefficients. Using the coefficient of determination, r-squared, the variability in the data was evaluated. The change in r-squared was 0.011 and the adjusted r-squared was 0.815, revealing that the model explained 81.5% of the variance in behavioral intention.

To evaluate the hypotheses, regression analysis was used within the SmartPLS software. This system was selected due its allowance for a smaller sample size to measure model relationships by reducing the influence of the sample size itself (Hair et al., 2019). Partial least squares structural equation modeling (PLS-SEM) is geared towards theory construction versus model prediction and allows for concurrent evaluation of the data. PLS-SEM allows for a two-stage modeling approach. The first stage is an exploratory factor analysis (EFA) and the second is a confirmatory factor analysis (CFA).

4.3 Data Analysis

The descriptive statistics were analyzed to detect possible outliers. The number of responses were 175 for each category. The minimum for age was 19, indicating that the youngest person who completed the survey was 19. The maximum for age was 81.5 indicating that the oldest person who completed the survey was 81.5 years old. The minimum for license status, residency status, and AV use experience were 0 indicating that no was selected for the answer item. The maximum for license status, residency status, and AV use experience were 1 indicating that yes was selected for the answer item. The minimum for gender was 0 indicating that male was selected for the answer item. The maximum for gender was 1 indicating that female was selected for the answer item. The average age was 46.15 years old. A majority of respondents were licensed, residents of Jacksonville, and had no AV use experience. About half of respondents were male and half were female.

Table 4.1: Descriptive Statistics

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Age	175	19.00	81.50	46.155	14.032
License Status	175	0.00	1.00	0.990	0.076
Residency Status	175	0.00	1.00	0.840	0.381
Gender	175	0.00	1.00	0.490	0.501
AV Use Experience	175	0.00	1.00	0.070	0.263

After analyzing the descriptive statistics, reliability of the subscales, and the exploratory factor analysis, the original data was imported into SmartPLS. Missing items were analyzed, removing the 3 responses with multiple missing data and the remaining 13 missing cases were treated with the mean replacement method to maintain the integrity of the data. Of the 13 missing

cases, 4 were age responses, 2 for regulatory legitimacy (R2), 1 for cognitive legitimacy (C5), 1 for normative legitimacy (N5), 1 for performance expectancy (PE3), 1 for hedonic motivation (HM3), and 1 for facilitating conditions (FC2), 1 for license status, and 1 for gender. The 4 question items N4, N7, PE3, and SI4 were also removed to clarify the measures.

After clarifying the data, an exploratory factor analysis was performed. A total of 6 components were created as seen in the pattern matrix (Table 4.2). The first component included behavioral intention, performance expectancy, and hedonic motivation items. The second included regulative legitimacy items. The third included effort expectancy items. The fourth and fifth included normative legitimacy items. The sixth included cognitive legitimacy items. Social influence and facilitating conditions had items spread across multiple components.

Table 4.2: Pattern Matrix

Pattern Matrix						
	Component					
	1	2	3	4	5	6
PE4	0.925					
PE2	0.917					
PE1	0.833					
BI2	0.775					
BI3	0.752					
PE3	0.736					
HM1	0.731					
BI1	0.725					
HM3	0.709					
HM2	0.696					
SI3	0.472			-0.412		0.357
FC3	0.470					
SI2	0.415			-0.396		0.390
R4		0.827				
R1		0.795				
R5		0.666				
R3		0.653				
R6		0.626				
SI4		0.329				
EE3			0.869			
EE1			0.862			
EE4			0.844			
FC2			0.778			
EE2			0.757			
FC1			0.595			
N8				0.588		
N6				0.572		
SI1	4.060			-0.452		0.389
N2					-0.660	
N1					-0.660	
N3					-0.620	
C5					-0.549	
N5					-0.490	
C2						0.874
C3						0.664
C1						0.634
C4					-0.346	0.583
FC4						0.529

The data was then imported into SmartPLS for further examination. The model was created to reflect the hypothesized relationships. Latent variables were created for performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, and behavioral intention. Moderating effect variables were created for regulative legitimacy, normative legitimacy, and cognitive legitimacy. Moderating effect variables were also created for the control variables including age, experience, license status, residency, and gender. The control variables were determined to not have a significant effect, so they were subsequently removed. In reviewing the inner model descriptive statistics (Table 4.3), it was determined that the data was not skewed and followed a normal distribution pattern.

Table 4.3: Inner Model

	Mean	Median	Observed min	Observed max	Standard deviation	Excess kurtosis	Skewness	Number of observations used	Cramér-von Mises test statistic	Cramér-von Mises p value
Behavioral Intention	-0.031	0.039	-1.652	1.271	0.431	1.256	-0.139	175	0.228	0.002

There was not abnormal correlation among the independent variables but there is high correlation among the legitimacy dimensions. All correlations were significant at the 0.01 level in a 2-tailed test. There was high correlation (Table 4.4) between effort expectancy, facilitating conditions, and hedonic motivation. There is moderate correlation between performance expectancy, social influence, effort expectancy and legitimacy. There is a weak correlation between performance expectancy, social influence, and legitimacy.

Table 4.4: Correlations

	Effort Expectancy	Facilitating Conditions	Hedonic Motivation	Performance Expectancy	Social Influence	Legitimacy x Performance Expectancy	Legitimacy x Social Influence	Legitimacy x Effort Expectancy
Effort Expectancy	1.000							
Facilitating Conditions	0.693	1.000						
Hedonic Motivation	0.631	0.654	1.000					
Performance Expectancy	0.458	0.618	0.736	1.000				
Social Influence	0.495	0.668	0.599	0.657	1.000			
Legitimacy x Performance Expectancy	-0.187	-0.155	-0.242	-0.180	-0.067	1.000		
Legitimacy x Social Influence	-0.092	-0.043	-0.103	-0.063	0.125	0.822	1.000	
Legitimacy x Effort Expectancy	-0.320	-0.175	-0.246	-0.156	-0.081	0.774	0.731	1.000

According to the results of the age categories (Table 4.5), the highest percent of respondents were aged between 36-45 at 26.3% (n=46), followed by respondents between 56-99 at 25.1% (n=44), then 46-55 at 24% (n=42), then 26-35 at 16.6% (n=29), and the remainder aged between 18-25 at 8% (n=14).

Table 4.5: Age Category Demographics

Age Categories	Frequency	Percent	Valid Percent	Cumulative Percent
18-25	14	8.0	8.0	8.0
26-35	29	16.6	16.6	24.6
36-45	46	26.3	26.3	50.9
46-55	42	24.0	24.0	74.9
56-99	44	25.1	25.1	100.0
Total	175	100.0	100.0	

According to the results of the license statuses (Table 4.6), out of 175 respondents, only 1 respondent indicated that they did not have a driver's license.

Table 4.6: License Status Demographics

License Status				
	Frequency	Percent	Valid Percent	Cumulative Percent
No Driver's License	1	0.6	0.6	0.6
Driver's License	174	99.4	99.4	100.0
Total	175	100.0	100.0	

According to the results of the residency statuses (Table 4.7), the majority of respondents were residents of Jacksonville, NC. Residents accounted for 84% (n=147) and nonresidents accounted for 16% (n=28).

Table 4.7: Residency Status Demographics

Residency Status				
	Frequency	Percent	Valid Percent	Cumulative Percent
Nonresident	28	16.0	16.0	16.0
Resident	147	84.0	84.0	100.0
Total	175	100.0	100.0	

According to the results of gender status (Table 4.8), the statuses were nearly even with 51.4% (n=90) respondents indicating male and 48.6% (n=85) respondents indicating female.

Table 4.8: Gender Demographics

Gender				
	Frequency	Percent	Valid Percent	Cumulative Percent
Male	90	51.4	51.4	51.4
Female	85	48.6	48.6	100.0
Total	175	100.0	100.0	

According to the results of the AV use experience status (Table 4.9), surprisingly, 7.4% (n=13) of respondents indicated that they had experience with autonomous vehicles. The remaining 92.6% (n=162) indicated that they had no experience with AV.

Table 4.9: AV Use Experience Demographics

AV Use Experience				
	Frequency	Percent	Valid Percent	Cumulative Percent
No Experience	162	92.6	92.6	92.6
Experience	13	7.4	7.4	100.0
Total	175	100.0	100.0	

4.4 Measurement Model

The data was imported into SmartPLS to perform a confirmatory factor analysis, examine validity, reliability, path coefficients, and goodness-of-fit. The PLS-SEM regression was performed reflecting all items above 0.6 (Figure 4.1). All outer loadings (Table 4.10) were retained.

Table 4.10: Factor Loadings

	Outer Loadings		Outer Loadings
Independent Variables		**Moderators**	
EE1 <- Effort Expectancy	0.936	C1 <- Cognitive Legitimacy	0.864
EE2 <- Effort Expectancy	0.913	C3 <- Cognitive Legitimacy	0.823
EE3 <- Effort Expectancy	0.948	C2 <- Cognitive Legitimacy	0.835
EE4 <- Effort Expectancy	0.938	C4 <- Cognitive Legitimacy	0.886
FC1 <- Facilitating Conditions	0.751	C5 <- Cognitive Legitimacy	0.843
FC2 <- Facilitating Conditions	0.679	N1 <- Normative Legitimacy	0.874
FC3 <- Facilitating Conditions	0.887	N2 <- Normative Legitimacy	0.860
FC4 <- Facilitating Conditions	0.741	N3 <- Normative Legitimacy	0.883
HM1 <- Hedonic Motivation	0.973	N5 <- Normative Legitimacy	0.854
HM2 <- Hedonic Motivation	0.957	N6 <- Normative Legitimacy	0.719
HM3 <- Hedonic Motivation	0.966	N8 <- Normative Legitimacy	0.671
PE1 <- Performance Expectancy	0.949	R1 <- Regulative Legitimacy	0.819
PE2 <- Performance Expectancy	0.968	R2 <- Regulative Legitimacy	0.772
PE4 <- Performance Expectancy	0.940	R3 <- Regulative Legitimacy	0.826
SI1 <- Social Influence	0.958	R4 <- Regulative Legitimacy	0.808
SI2 <- Social Influence	0.957	R5 <- Regulative Legitimacy	0.704
SI3 <- Social Influence	0.971	R6 <- Regulative Legitimacy	0.837
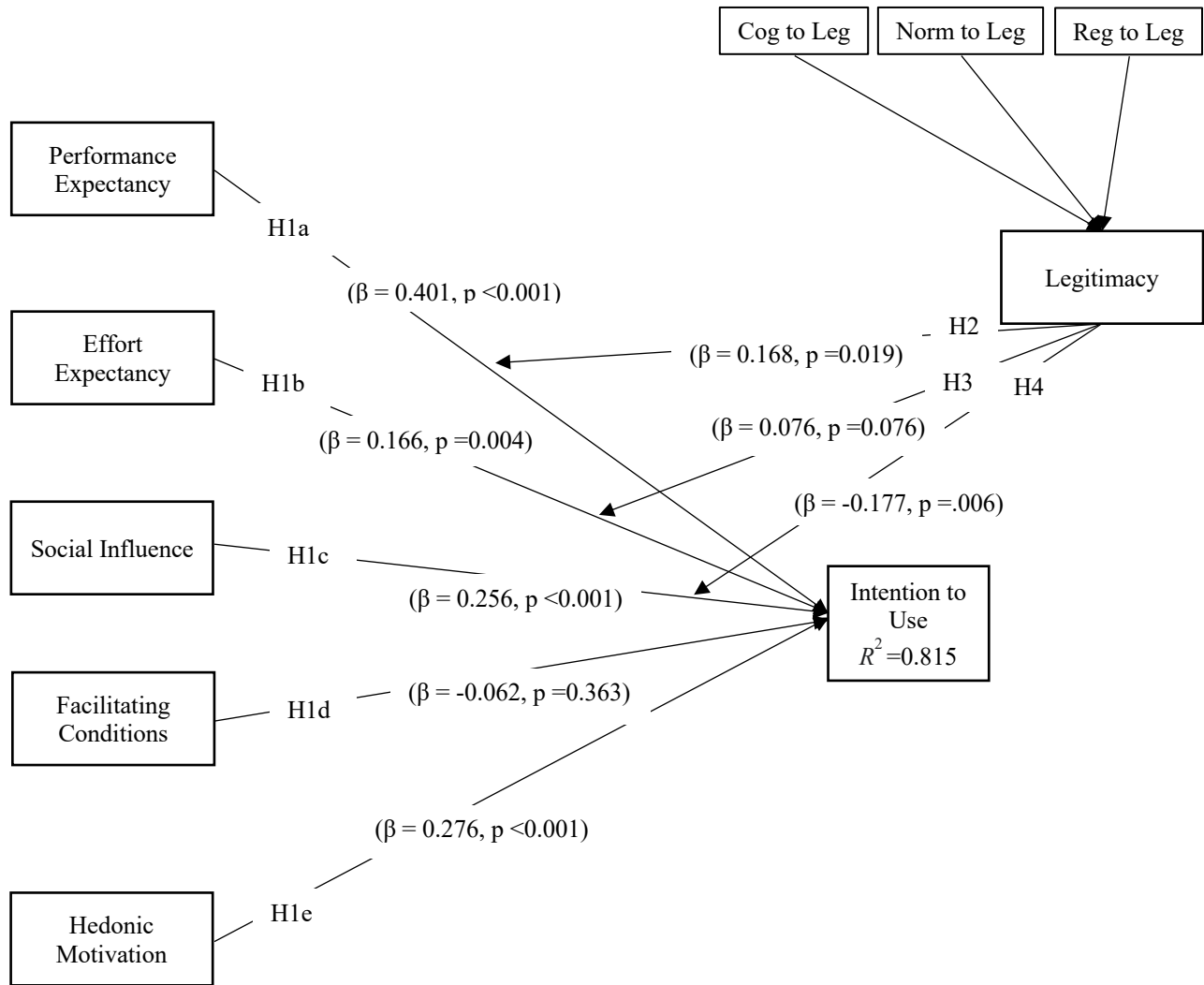
Figure 4.1: PLS-SEM Graphical Model

Convergent validity allows researchers to gauge how similarly different measurements of the same constructs are related. Validity is established when multiple measurements of the same item share consistent results. By reviewing the average variance extracted (AVE) values (Table 4.11), it was determined that they are all above 0.5 which is the minimum value according to Hair et al., (2020). This indicates that each measure is converging to measure the construct successfully by explaining more than half of the variance between the question items for the construct.

Table 4.11: Reliability Analysis

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Cognitive Legitimacy	0.904	0.907	0.929	0.724
Effort Expectancy	0.951	0.951	0.965	0.872
Facilitating Conditions	0.777	0.872	0.851	0.590
Hedonic Motivation	0.963	0.964	0.976	0.932
Normative Legitimacy	0.896	0.906	0.921	0.664
Performance Expectancy	0.949	0.954	0.967	0.907
Regulative Legitimacy	0.884	0.886	0.912	0.635
Social Influence	0.960	0.960	0.974	0.926

Discriminant validity is used to measure that each construct is separate from other constructs. Validity is established when the indicator measurements are higher for a particular construct than any other construct (Table 4.12). This can be viewed visually as cross-loadings or measured by the square root of AVE being higher than other correlations for that construct.

Table 4.12: Fornell-Larcker Criterion

	Cognitive Legitimacy	Effort Expectancy	Facilitating Conditions	Hedonic Motivation	Normative Legitimacy	Performance Expectancy	Regulative Legitimacy	Social Influence
Cognitive Legitimacy	0.851							
Effort Expectancy	0.534	0.934						
Facilitating Conditions	0.654	0.693	0.768					
Hedonic Motivation	0.595	0.631	0.654	0.965				
Normative Legitimacy	0.808	0.616	0.623	0.626	0.815			
Performance Expectancy	0.581	0.458	0.618	0.736	0.631	0.952		
Regulative Legitimacy	0.604	0.465	0.543	0.464	0.668	0.522	0.797	
Social Influence	0.705	0.495	0.668	0.599	0.634	0.657	0.460	0.962

The results of the Heterotrait-Monotrait (HTMT) ratio (Figure 4.2) are successful in that the measurements are all below 0.9. Each of the values in the HTMT ratio matrix (Table 4.13) are below the diagonal line of the construct being measured against itself. This signifies that there is greater internal versus external commonality.

Table 4.13: Heterotrait-Monotrait Ratio

|	Cognitive Legitimacy	Effort Expectancy	Facilitating Conditions	Hedonic Motivation	Normative Legitimacy	Performance Expectancy	Regulative Legitimacy	Social Influence
Cognitive Legitimacy								
Effort Expectancy	0.573							
Facilitating Conditions	0.731	0.824						
Hedonic Motivation	0.636	0.660	0.711					
Normative Legitimacy	0.885	0.671	0.715	0.679				
Performance Expectancy	0.618	0.481	0.660	0.771	0.683			
Regulative Legitimacy	0.673	0.505	0.634	0.500	0.752	0.566		
Social Influence	0.754	0.517	0.716	0.623	0.672	0.685	0.499	
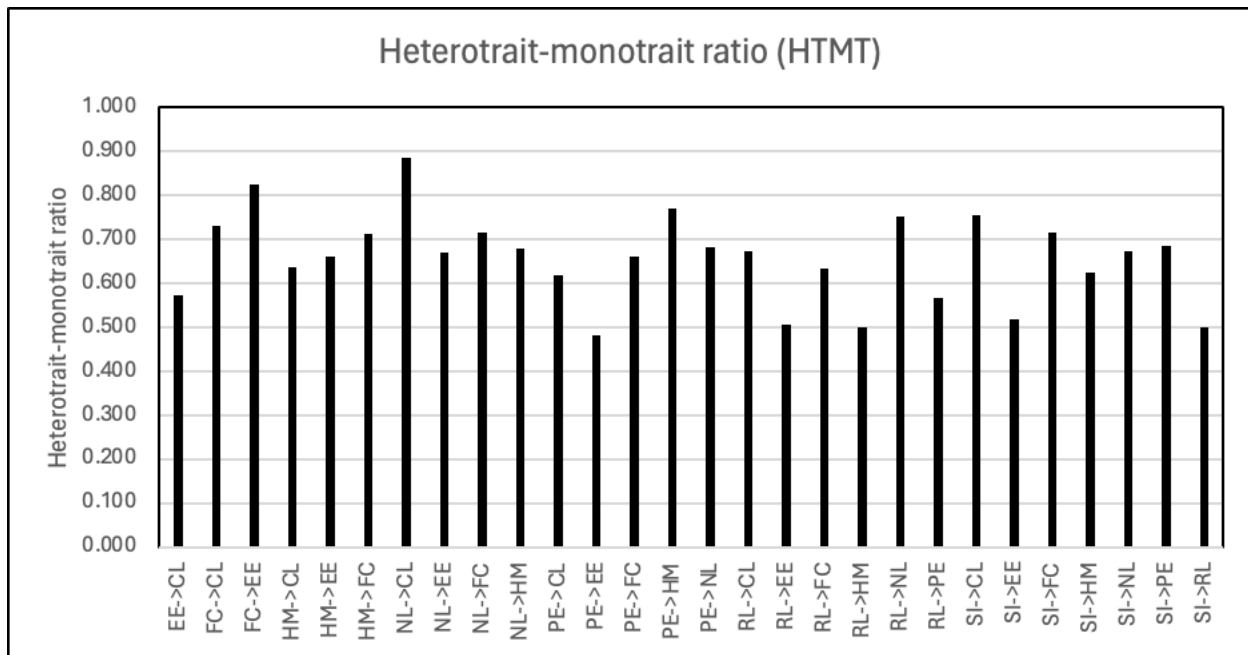
Figure 4.2: Heterotrait-Monotrait Ratio Bar Chart

The effect size is the strength of the associations of the variables. Cohen's f is a standardized measurement for the average effect in a population. Performance expectancy has a large effect size while, hedonic motivation, and social influence have a medium effect size (Table

4.14). Effort expectancy and the moderating relationships of legitimacy on performance expectancy and behavioral intention and legitimacy on social influence and behavioral intention have a small effect size. Facilitating conditions and the moderated relationship of legitimacy on effort expectancy and behavioral intention has a less than small effect size (Cohen, 1988).

Table 4.14: Effect Size (f-square)

	f-square
Effort Expectancy -> Behavioral Intention	0.057
Facilitating Conditions -> Behavioral Intention	0.007
Hedonic Motivation -> Behavioral Intention	0.137
Performance Expectancy -> Behavioral Intention	0.309
Social Influence -> Behavioral Intention	0.130
Legitimacy x Performance Expectancy -> Behavioral Intention	0.041
Legitimacy x Effort Expectancy -> Behavioral Intention	0.016
Legitimacy x Social Influence -> Behavioral Intention	0.056

Multicollinearity is present when substantial correlations between constructs exist and is measured by the variance inflation factor (VIF). According to Hair et al., (2017) the VIF values should be less than 5.0 before they are considered a cause for concern. The VIF values in this study were under the desired threshold, therefore multicollinearity was not an issue (Table 4.15).

Table 4.15: Construct Collinearity Variance Inflation Factor

	VIF
Effort Expectancy -> Behavioral Intention	2.633
Facilitating Conditions -> Behavioral Intention	2.935
Hedonic Motivation -> Behavioral Intention	3.005
Performance Expectancy -> Behavioral Intention	2.811
Social Influence -> Behavioral Intention	2.712
Legitimacy x Performance Expectancy -> Behavioral Intention	4.174
Legitimacy x Social Influence -> Behavioral Intention	3.827
Legitimacy x Effort Expectancy -> Behavioral Intention	3.119

The outer weights and significance values of the indicators are located in Table 4.16. Each question item is weighted between 0.222 and 0.488. All indicators were significant. Weights of

question items are the primary assessment criterion for determining the importance of each indicator in formative measurement models according to Hair et al., (2017).

Table 4.16: Outer Weights and Significance

	Outer weights	P values
BI1 <- Behavioral Intention	0.348	0.000
BI2 <- Behavioral Intention	0.351	0.000
BI3 <- Behavioral Intention	0.346	0.000
EE1 <- Effort Expectancy	0.264	0.000
EE2 <- Effort Expectancy	0.278	0.000
EE3 <- Effort Expectancy	0.265	0.000
EE4 <- Effort Expectancy	0.264	0.000
FC1 <- Facilitating Conditions	0.250	0.000
FC2 <- Facilitating Conditions	0.222	0.000
FC3 <- Facilitating Conditions	0.488	0.000
FC4 <- Facilitating Conditions	0.309	0.000
HM1 <- Hedonic Motivation	0.345	0.000
HM2 <- Hedonic Motivation	0.339	0.000
HM3 <- Hedonic Motivation	0.352	0.000
PE1 <- Performance Expectancy	0.376	0.000
PE2 <- Performance Expectancy	0.352	0.000
PE4 <- Performance Expectancy	0.322	0.000
SI1 <- Social Influence	0.344	0.000
SI2 <- Social Influence	0.343	0.000
SI3 <- Social Influence	0.352	0.000

The r-squared value was 0.815 with an adjusted r-squared of 0.804 as shown in Table 4.17. This model is able to explain approximately 82% of the variance in the dependent variable from the indications of the independent variables.

Table 4.17: Coefficients of Determination

	R-squared	R-square adjusted
Behavioral Intention	0.815	0.804

4.5 Hypotheses Testing

The quantitative framework is designed to answer the hypothesized questions by computing the relationships among variables. The relationships relating to the unified theory of acceptance and use of technology (hypotheses H1a, H1b, H1c, H1d, and H1e) were partially supported. Results indicated that performance expectancy (H1a), effort expectancy (H1b), social influence (H1c), and hedonic motivation (H1e) were statistically supported to have a positive relationship with the behavioral intention to use. Facilitating conditions (H1d) was not statistically significant and was therefore not supported to have a relationship with the behavioral intention to use.

The relationships relating to institutional theory (hypotheses H2, H3, and H4) were partially supported. Since legitimacy is a multi-dimensional construct the normative, cognitive, and regulative legitimacy items were combined. Legitimacy (H2) had a significant positive moderating relationship between performance expectancy and the behavioral intention to use. Legitimacy (H4) had a significant negative moderating relationship between social influence and the behavioral intention to use.

Table 4.18: Path Coefficients and Significance for Direct Relationships

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Effort Expectancy -> Behavioral Intention	0.166	0.164	0.057	2.905	0.004
Facilitating Conditions -> Behavioral Intention	-0.062	-0.063	0.068	0.910	0.363
Hedonic Motivation -> Behavioral Intention	0.276	0.268	0.066	4.186	0.000
Performance Expectancy -> Behavioral Intention	0.401	0.408	0.074	5.443	0.000
Social Influence -> Behavioral Intention	0.256	0.251	0.062	4.106	0.000

H1a: There is a positive relationship between performance expectancy and behavioral intention supported by the model.

H1a examines if there is a positive relationship between performance expectancy and behavioral intention. The results indicated that performance expectancy does have a strong positive relationship with behavioral intention that is significant ($\beta = 0.401$, $t = 5.443$, $p <0.001$). Thus, H1a was supported.

H1b: There is a positive relationship between effort expectancy and behavioral intention supported by the model.

H1b examines if there is a positive relationship between effort expectancy and behavioral intention. The results indicated that effort expectancy does have a strong positive relationship with behavioral intention that is significant ($\beta = 0.166$, $t = 2.905$, $p =0.004$). Thus, H1b was supported.

H1c: There is a positive relationship between social influence and behavioral intention supported by the model.

H1c examines if there is a positive relationship between social influence and behavioral intention. The results indicated that social influence does have a strong positive relationship with behavioral intention that is significant ($\beta = 0.265$, $t = 4.106$, $p <0.001$). Thus, H1c was supported.

H1d: There is a positive relationship between facilitating conditions and behavioral intention supported by the model.

H1d examines if there is a positive relationship between facilitating conditions and behavioral intention. The results indicated that facilitating conditions does not have a strong positive relationship with behavioral intention that is significant ($\beta = -0.062$, $t = 0.910$, $p =0.363$). Thus, H1d was not supported.

H1e: There is a positive relationship between hedonic motivation and behavioral intention supported by the model.

H1e examines if there is a positive relationship between hedonic motivation and behavioral intention. The results indicated that hedonic motivation does have a strong positive relationship with behavioral intention that is significant ($\beta = 0.276$, t = 4.186, p <0.001). Thus, H1e was supported.

Table 4.19: Path Coefficients and Significance for Moderated Relationships

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Legitimacy x Performance Expectancy -> Behavioral Intention	0.168	0.169	0.071	2.356	0.019
Legitimacy x Effort Expectancy -> Behavioral Intention	0.076	0.078	0.043	1.776	0.076
Legitimacy x Social Influence -> Behavioral Intention	-0.177	-0.180	0.064	2.770	0.006

H2: Legitimacy positively moderates the relationship between performance expectancy and behavioral intention. Legitimacy strengthens the relationship.

H2 examines if legitimacy has a significant effect on the relationship between performance expectancy and behavioral intention. The results indicated that legitimacy does have a positive effect on the association between performance expectancy and behavioral intention and is significant ($\beta = 0.168$, t = 2.356, p =0.019). Thus, H2 was supported.

H3: Legitimacy positively moderates the relationship between effort expectancy and behavioral intention. Legitimacy strengthens the relationship.

H3 examines if legitimacy has a significant effect on the relationship between effort expectancy and behavioral intention. The results indicated that legitimacy does not have a positive effect on the association between effort expectancy and behavioral intention and is not significant ($\beta = 0.076$, t = 1.776, p =0.076). Thus, H3 was not supported.

H4: Legitimacy positively moderates the relationship between social influence and behavioral intention. Legitimacy strengthens the relationship.

H4 examines if legitimacy has a significant effect on the relationship between social influence and behavioral intention. The results indicated that legitimacy does have a negative effect on the association between social influence and behavioral intention that is significant (β = -0.177, t = 2.770, p =0.006). Thus, H4 was not supported.

Table 4.20: Results of Hypothesized Relationships

	Hypothesized Relationships	Results
H1a	Intention to use is positively associated with performance expectancy	Supported
H1b	Intention to use is positively associated with effort expectancy	Supported
H1c	Intention to use is positively associated with social influence	Supported
H1d	Intention to use is positively associated with facilitating conditions	Not Supported
H1e	Intention to use is positively associated with hedonic motivations	Supported
H2	Legitimacy positively moderates the relationship between performance expectancy and the intention to use	Supported
H3	Legitimacy positively moderates the relationship between effort expectancy and the intention to use	Not Supported
H4	Legitimacy positively moderates the relationship between social influence and the intention to use	Not Supported*
	* Significant Reverse Relationship	

Figure 4.3: Slope Analysis of the moderating effect of legitimacy on the relationship between performance expectancy and behavioral intention

The slope of the red line, shown in Figure 4.3, suggests that legitimacy has less of an influence on the relationship between performance expectancy and behavioral intention. This indicates that the rise in behavioral intention is less significantly correlated with performance expectation when legitimacy is low.
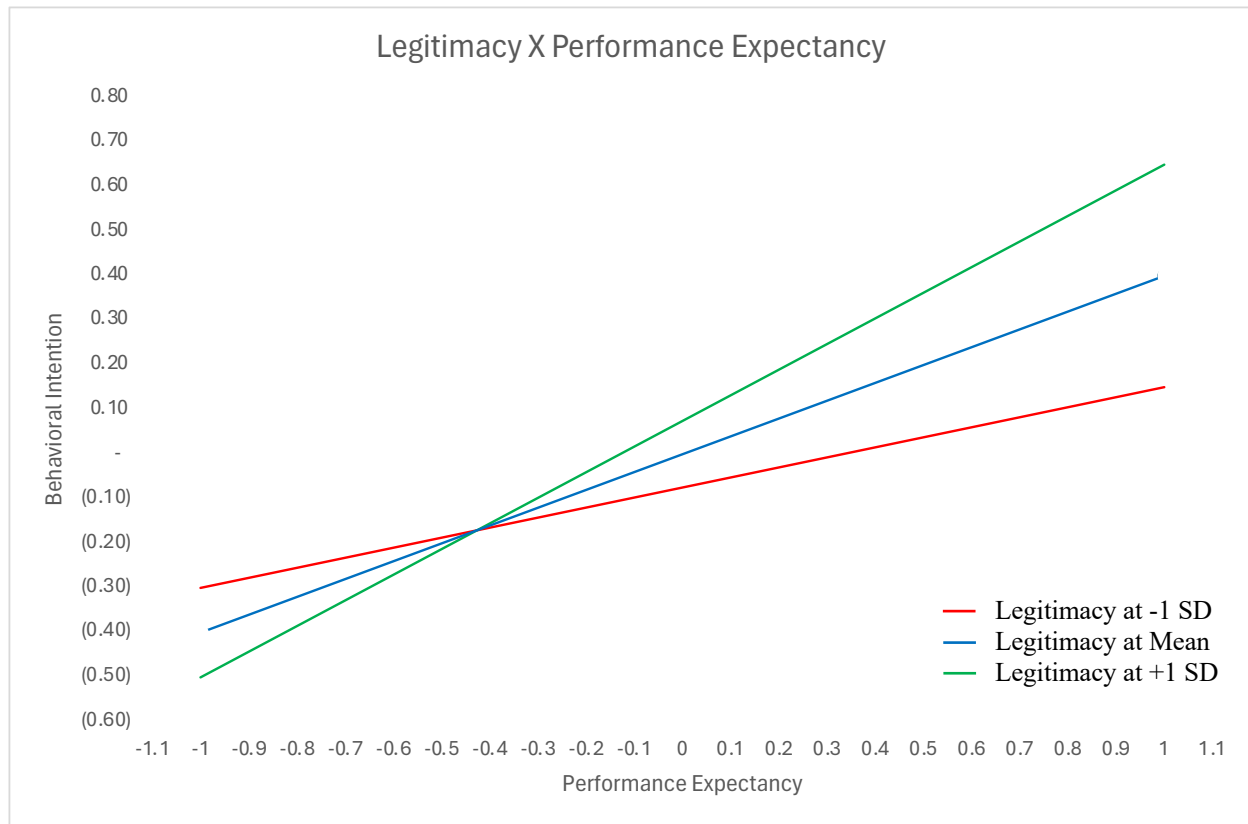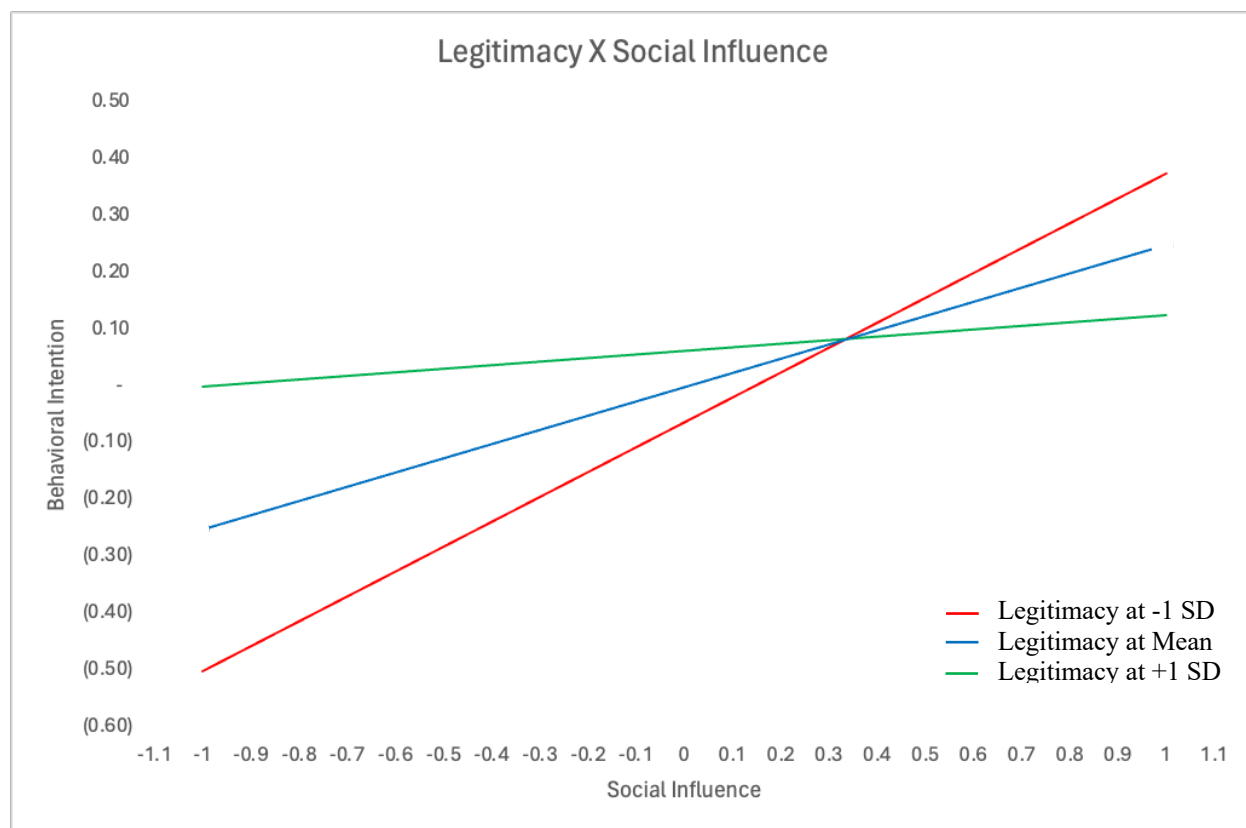
Figure 4.4: Slope Analysis of the moderating effect of legitimacy on the relationship between social influence and behavioral intention

The slope of the red line, shown in Figure 4.4, suggests that legitimacy has more of an influence on the relationship between social influence and behavioral intention. This indicates that the decrease in behavioral intention is more significantly correlated with the influence of an individual's social circle when legitimacy is high.

The next chapter provides an overview of the research as well as conclusions, implications, and potential future research.

CHAPTER 5: CONCLUSION, IMPLICATIONS, AND FUTURE RESEARCH

5.1 Introduction

This chapter provides a conclusion for this research as well as implications of findings and avenues for future research. Complex technology adoption is an important topic because of the potential use and benefit of AV. This study improves insight on how complex adoption and legitimacy is measured. The aim of research was to examine the influence of legitimacy on technology acceptance. This study offers distinct and complimentary findings to prior research.

This chapter is organized as follows. First, an overview is provided of the framework. Second, an overview is provided of the benefits of the research. Third, a discussion of the theoretical model. Fourth, a conclusion is provided of the research. Fifth, a discussion of the limitations of the study. Lastly, implications are provided of the research and directions for future research.

5.2 Framework

Technology adoption models have been around for decades, and new models have been presented over the years to fill the gap in unexplained variances of technology adoption. The model used in this study is theoretically significant due to the integration of two streams of research: technology adoption and institutional theory. By including legitimacy in the study of adoption, the research can account for the pressures of the environment in which the technology will operate.

This study hypothesized that performance expectancy would have a positive association to intention to use (H1a). Prior research has shown that performance expectancy is a predictor of the behavioral intention to use autonomous vehicles (Bernhard et al., 2020; Goldbach et al., 2022; Kaye et al., 2020; Madigan et al., 2017; Morrison and Belle, 2020; Smyth et al., 2021; Yuen et al., 2020). The results of this study are consistent with these findings.

This study hypothesized that effort expectancy would have a positive association to intention to use (H1b). Previous research has shown that effort expectancy is a predictor of the behavioral intention to use autonomous vehicles (Madigan et al., 2017; Morrison and Belle, 2020; Smyth et al., 2021; Yuen et al., 2020). The results of this study are consistent with these findings.

This study hypothesized that social influence would have a positive association to intention to use (H1c). Prior research has shown that social influence is a predictor of the behavioral intention to use autonomous vehicles (Madigan et al., 2017; Morrison and Belle, 2020; Smyth et al., 2021; Yuen et al., 2020). The results of this study are consistent with these findings.

This study hypothesized that facilitating conditions would have a positive association to intention to use (H1d). Previous research has shown that facilitating conditions is a predictor of the behavioral intention to use autonomous vehicles (Kapser and Abdelrahman, 2020; Madigan et al., 2017; Park et al., 2021). The results of this study are inconsistent with these findings. Prior research has also shown that facilitating conditions could be refined into multiple parameters including education level, financial capabilities, human resources, and infrastructure (Paul et al., 2015). Additional questions may be needed to extend the scope of theses parameters of facilitating conditions.

This study hypothesized that hedonic motivation would have a positive association to intention to use (H1e). Prior research has shown that hedonic motivation is a predictor of the behavioral intention to use autonomous vehicles (Kapser and Abdelrahman, 2020; Madigan et al., 2017). The results of this study are consistent with these findings.

This study hypothesized that legitimacy positively moderated the association between performance expectancy and intention to use (H2). Previous research has shown that legitimacy has a positive moderating effect on the relationship between capabilities and outcomes (Abrudan

et al., 2022; Reddy, 2019). While performance is an essential driver of AV adoption (Madigan et al., 2017; Nordhoff et al., 2020), institutional pressures can sway the influence of individuals (Bozan et al., 2016; Fauzi and Sheng, 2022). The results of this study are consistent with these findings.

This study hypothesized that legitimacy positively moderated the association between effort expectancy and intention to use (H3). Prior research has shown that legitimacy has a positive moderating effect on the relationship between effort and intention (Beatson and Halloran, 2013; Li et al., 2022). While effort expectancy is a fundamental driver of AV adoption (Foroughi et al., 2023), institutional pressures can sway the influence of individuals (Bozan et al., 2016; Fauzi and Sheng, 2022). The results of this study are inconsistent with these findings. Individuals who responded to the survey may been conflicted on how they view the environmental pressures on autonomous vehicle adoption.

This study hypothesized that legitimacy positively moderated the association between social influence and intention to use (H4). Previous research has shown that legitimacy has a positive moderating effect on the relationship between social influences and outcomes (Chen et al., 2016; Hays and Goldstein, 2015). While social influence is a central driver of AV adoption (Madigan et al., 2017; Nordhoff et al., 2020), institutional pressures can sway the influence of individuals (Bozan et al., 2016; Fauzi and Sheng, 2022). The results of this study are opposite to these findings. Instances of high legitimacy show a decrease in the impact of social influence. And conversely, instances of low legitimacy show an increase in the impact of social influence. If a product is deemed legitimate by the individual than the fear of social repercussions is low.

The largest contribution of this research is demonstrating that legitimacy impacts individuals' behavioral intention on technology adoption decisions. Legitimacy influences the

relationships between the determinants of use behavior and the intent to use autonomous technology. Specifically, legitimacy has a positive moderating effect on the relationship between performance expectancy and intention. Legitimacy has a negative moderating effect on the relationship between social influence and intention. Normative, cognitive, and regulative institutional pressures were able to capture the essence of multi-dimensional legitimacy. The empirical results suggest that the environment influences adoption behavior in a multi-dimensional capacity. The survey results revealed that respondents were both positive and negatively influenced by the legitimacy of autonomous vehicles. While legitimacy has been vastly studied, there has been little research on legitimacy as a multi-dimensional construct and the effects of legitimacy on emerging technologies. This study adds to the empirical research that supports the environmental influence on individual technology adoption.

Previous frameworks have explained approximately 70% of the prediction variances while this framework explained approximately 82% of the variance. A similar study using the same independent and control variables had an explanatory power of 58.6% (Madigan et al., 2017). Other similar studies using the same independent, control variables, and additional independent variables such as trust in safety, price value, habit, and risk had explanatory power of 71.1% (Morrison et al. 2020) and 77.1% (Korkmaz et al., 2022). Comparing these studies to the current research demonstrates that legitimacy as a construct provides explanation in adoption behavior. This framework provides empirical support that legitimacy is multi-dimensional and should be measured as a multi-dimensional construct.

5.3 Conclusion

This study demonstrated that environmental factors should be taken into consideration when measuring the behavioral intention to adopt a technology. Individuals look to others outside

of their social circle to make decisions regarding the adoption of a complex technology. The results indicate that legitimacy is a viable addition to a complex adoption model.

This study also demonstrates the value that individuals place on others' opinions beyond their social circles. Consistent with the research of Bitektine and Haack (2015), the action that the individual takes, regarding technology adoption, is modified by the anticipated reaction others would have to their judgement. The integrated framework achieved a greater level of explained variance than traditional models. An important goal of this research was to create a model for complex adoption that certain complex technology requires in order to be fully functional.

This research had an unexpected finding. The moderating effect of legitimacy on the relationship between social influence and behavioral intention was negatively related. This indicates that when legitimacy is high the influence of an individual's social circle is more significantly correlated with behavioral intention and when legitimacy is low the influence of an individuals' social circle is less significantly correlated with behavioral intention.

With the introduction of AV, many trials have had success, but any failure has been advertised in the media. This could lead an individual to believe that when society views a technology as legitimate, their social circle's opinions are less important leading to an unexpected finding in the data. When a technology is determined to have higher legitimacy, an individual's social circle is deemed as less important in the consideration of behavioral intentions.

5.4 Limitations

This study recognizes a few limitations of the research. First, the generalizability of the study may be limited due to using a specific environment for data collection. Some environments or areas of data collection may find different results. This study used a specific environment to limit the biases of different geographic areas. Along with possible unique terrains, each area or

group of areas have different laws that vary by state, demographic backgrounds of residents, and shared customs of interactions.

Second, the data may have been impacted by not asking if the respondent worked in Jacksonville. Many individuals live in the outskirts of town and work in the city. The control variable for residency status may have been too limiting for the purposes of this study. A person who regularly commutes in Jacksonville, such as a daily work commute, could have been included in the study. Responses from these individuals may have been too similar to individuals who did not live or work in Jacksonville, but that information was not collected to compare against individuals who live and work in a separate geographical area.

Third, sample size may have also impacted the results. A total of 175 usable responses were collected, which met the G*power requirement using a medium effect size, but additional responses using a larger effect size may yield different results. Some of the control variable responses had a majority of one type of response i.e. license status had 1 response for no and 174 for yes, so the impact was not able to be measured.

Fourth, since the data is self-reported, some measurement of the variables will be impacted by personal biases. This research study applied several methods, such as reverse coded items, to minimize self-reporting errors.

5.5 Implications for Research

There are many implications from this research study. First, complex and interdependent technology adoption should be approached differently than simple technology adoption. Some technology requires additional consideration prior to adopting. Second, legitimacy is a multi-dimensional construct and should be measured accordingly. Results might differ due to the perception of the environment by the individual. Third, predictive validity is greater when

accounting for the environment. Future research should be performed to test the replicability of these results.

5.6 Implications for Practitioners

Practitioners should build support of the general public by appealing to a wide range of regulatory, cultural, and day-to-day conceptions. Each of these areas can have a different impact on the behavioral intention to use or adopt a technology. Individuals are inquiring more and more from unknown individuals i.e. Yelp Reviews, product awards, star ratings, etc. prior to making a technology purchase. Practitioners should use these avenues as tools to help frame their technology into the institutional environment.

There are immense benefits projected of the widespread acceptance autonomous vehicles. The widespread use of this technology could reduce crashes, provide mobility, and allow for urban sprawl (Adnan et al., 2018). In order for these benefits to be realized, government officials need to begin upfitting the environment to support this interconnected and complex technology. Automotive regulations need to be updated to safeguard automotive manufactures and consumers from detrimental liabilities that will inevitably arise.

5.7 Directions for Future Research

There are many directions for future research. First, a broader location is needed to test the generalizability of the study. Many areas may have similar features, but each area is truly unique. Each state has separate regulations, their own capital improvement budget for infrastructure repairs, and demographic makeup of their residents. Future research should study a group of rural towns with similar demographics and regulations and compare it to another group of densely populated cities with similar demographics and regulations to see if the infrastructure differences impact an individual's behavioral intention to use.

Second, additional respondents are needed to test the validity of the results. Increasing the sample size may confirm the result of this study or may render different results. There is little empirical support in prior research so additional testing is needed.

Third, the robustness of variables must be further evaluated. Other predictors may still be needed to better predict dimensions of legitimacy. While this study closes the gap on explained differences, there are still unexplained variances.

REFERENCES

Abrudan, D. B., Rafi, N., Daianu, D. C., & Kalyar, M. N. (2022). Linking green intellectual capital with green innovation: Examining the roles of green dynamic capabilities and motivation to achieve legitimacy'. Agricultural Economics, 68(7), 250-258.

Adnan, N., Md Nordin, S., bin Bahruddin, M. A., & Ali, M. (2018). How trust can drive forward the user acceptance to the technology? In-vehicle technology for autonomous vehicle. Transportation Research Part A: Policy and Practice, 118, 819-836. https://doi.org/https://doi.org/10.1016/j.tra.2018.10.019

Ajzen, I., & Fishbein, M. (1975). A Bayesian analysis of attribution processes. Psychological bulletin, 82(2), 261.

Alamin, A. A., Wilkin, C. L., Yeoh, W., & Warren, M. (2020). The Impact of Self-Efficacy on Accountants' Behavioral Intention to Adopt and Use Accounting Information Systems [Article]. Journal of Information Systems, 34(3), 31-46. https://doi.org/10.2308/isys-52617

Aldrich, H. E., & Fiol, C. M. (1994). Fools rush in? The institutional context of industry creation. Academy of management review, 19(4), 645-670.

Alexiou, K., & Wiggins, J. (2019). Measuring individual legitimacy perceptions: Scale development and validation. Strategic Organization, 17(4), 470-496.

Asgari, H., & Jin, X. (2019). Incorporating Attitudinal Factors to Examine Adoption of and Willingness to Pay for Autonomous Vehicles. Transportation Research Record, 2673(8), 418-429. https://doi.org/10.1177/0361198119839987

Bansal, P., Kockelman, K. M., & Singh, A. (2016). Assessing public opinions of and interest in new vehicle technologies: An Austin perspective. Transportation Research Part C: Emerging Technologies, 67, 1-14. https://doi.org/https://doi.org/10.1016/j.trc.2016.01.019

Beatson, R. M., & Halloran, M. J. (2013). Group Status and Hierarchy Legitimacy Effects on Effort Versus Ability Attributions for Ingroup and Outgroup Failures. Current Psychology, 32(3), 234-241. https://doi.org/10.1007/s12144-013-9179-0

Bernhard, C., Oberfeld, D., Hoffmann, C., Weismüller, D., & Hecht, H. (2020). User acceptance of automated public transport: Valence of an autonomous minibus experience. Transportation Research Part F: Traffic Psychology and Behaviour, 70, 109-123.

Berrada, J., Mouhoubi, I., & Christoforou, Z. (2020). Factors of successful implementation and diffusion of services based on autonomous vehicles: Users' acceptance and operators' profitability. Research in Transportation Economics, 83, 100902.

Bitektine, A., & Haack, P. (2015). The "Macro" and the "Micro" of Legitimacy: Toward a Multilevel Theory of the Legitimacy Process. Academy of management review, 40, 49-75. https://doi.org/10.5465/amr.2013.0318

Bitektine, A., Hill, K., Song, F., & Vandenberghe, C. (2020). Organizational Legitimacy, Reputation, and Status: Insights from Micro-Level Measurement [Article]. *Academy of Management Discoveries*, *6*(1), 107-136. https://doi.org/10.5465/amd.2017.0007

Bozan, K., Parker, K., & Davey, B. (2016, 2016-01-01). A Closer Look at the Social Influence.

Bridwell-Mitchell, E. N., & Mezias, S. J.. (2012). The Quest for Cognitive Legitimacy: Organizational Identity Crafting and Internal Stakeholder Support. Journal of Change Management, 12(2), 189–207. https://doi.org/10.1080/14697017.2011.645053

Brown, S. A., & Venkatesh, V. (2005). Model of adoption of technology in households: A baseline model test and extension incorporating household life cycle. MIS quarterly, 399-426.

Chatterjee, S., & Bhattacharjee, K. K. (2020). Adoption of artificial intelligence in higher education: A quantitative analysis using structural equation modelling. Education and Information Technologies, 25, 3443-3463.

Construct in the UTAUT Model: An Institutional Theory Based Approach to Investigate Health IT Adoption Patterns of the Elderly. 2016 49th Hawaii International Conference on System Sciences (HICSS).

Cosh, K., Wordingham, S., & Ramingwong, S. (2018, 2018//). Investigating Public Opinion Regarding Autonomous Vehicles: A Perspective from Chiang Mai, Thailand. IT Convergence and Security 2017, Singapore.

Cabral, A. R. (2023, March 11). Saudi Arabia aims for 15% of public vehicles to be autonomous by 2030. The National. https://www.thenationalnews.com/business/technology/2023/03/08/saudi-arabia-aims-for-15-of-public-vehicles-to-be-autonomous-by-2030/

Carino, M., & Huges, R. (2023, October 11). Autonomous vehicles: They're not there yet. Marketplace Tech. https://www.marketplace.org/shows/marketplace-tech/autonomous-vehicles-theyre-not-there-yet/

Chen, J., Wu, H., & Yao, X. (2016). Status, legitimacy, and the presence of outside directors in China. Management Decision, 54(5), 1205-1221.

Davis, F. D. (1986). A technology acceptance model for empirically testing new end-user information systems: Theory and results Massachusetts Institute of Technology.

De Bruyne, J., & Werbrouck, J. (2018). Merging self-driving cars with the law. *Computer law & security review*, *34*(5), 1150-1153.

Deeds, D. L., Mang, P. Y., & Frandsen, M. L. (2004). The Influence of Firms' and Industries' Legitimacy on the Flow of Capital into High-Technology Ventures. Strategic Organization, 2(1), 9-34. https://doi.org/10.1177/1476127004040913

Deephouse, D. L., Bundy, J., Tost, L. P., & Suchman, M. C. (2017). Organizational legitimacy: Six key questions. The SAGE handbook of organizational institutionalism, 4(2), 27-54.

Deephouse, D. L., & Suchman, M. (2008). Legitimacy in organizational institutionalism. The Sage handbook of organizational institutionalism, 49, 66, 77.

Díez-Martín F, Prado-Roman C and Blanco-Gonzalez A (2013) Beyond legitimacy: Legitimacy types and organizational success. Management Decision 51(10): 1954–1969.

Díez-Martín, F., Miotto, G., & Cachón-Rodríguez, G. (2022). Organizational legitimacy perception: Gender and uncertainty as bias for evaluation criteria. Journal of Business Research, 139, 426-436. https://doi.org/https://doi.org/10.1016/j.jbusres.2021.09.073

DiMaggio PJ, Powell WW. The iron cage revisited: institutional isomorphism in organizational fields. American Sociological Review 1983;48:147-160.

Dowling, J., & Pfeffer, J. (1975). Organizational legitimacy: Social values and organizational behavior. Pacific sociological review, 18(1), 122-136.

Edwards, J. R. (2001). Multidimensional Constructs in Organizational Behavior Research: An Integrative Analytical Framework. Organizational Research Methods, 4(2), 144-192. https://doi.org/10.1177/109442810142004

Elsbach, K. D. (1994). Managing Organizational Legitimacy in the California Cattle Industry: The Construction and Effectiveness of Verbal Accounts. *Administrative Science Quarterly*, *39*(1), 57-88. https://doi.org/10.2307/2393494

Erdélyi, O. J., & Goldsmith, J. (2018). Regulating artificial intelligence: Proposal for a global solution. Proceedings of the 2018 AAAI/ACM Conference on AI, Ethics, and Society.

Fagnant, D. J., & Kockelman, K. M. (2015). Dynamic ride-sharing and optimal fleet sizing for a system of shared autonomous vehicles.

Fauzi, A. A., & Sheng, M. L. (2022). The digitalization of micro, small, and medium-sized enterprises (MSMEs): An institutional theory perspective. Journal of Small Business Management, 60(6), 1288-1313.

Feys, M., Rombaut, E., & Vanhaverbeke, L. (2020). Experience and Acceptance of Autonomous Shuttles in the Brussels Capital Region. Sustainability, 12(20), 8403. https://doi.org/10.3390/su12208403.

Foreman P and Whetten DA (2002) Members' identification with multiple-identity organizations. Organization Science 13(6): 618–635.

Gill, T. (2021). Ethical dilemmas are really important to potential adopters of autonomous vehicles. Ethics and Information Technology, 23(4), 657-673.

Giuliani, E., Nieri, F., & Vezzulli, A. (2023). Big Profits, Big Harm? Exploring the Link Between Firm Financial Performance and Human Rights Misbehavior. Business & Society, 00076503221144994.

Goldbach, C., Sickmann, J., Pitz, T., & Zimasa, T. (2022). Towards autonomous public transportation: Attitudes and intentions of the local population. Transportation Research Interdisciplinary Perspectives, 13, 100504.

Griffor, E. (2023, January 18). Cruising Toward Self-Driving Cars: Standards and Testing Will Help Keep Autonomous Vehicles Moving Safely on the Road. https://www.nist.gov/blogs/taking-measure/cruising-toward-self-driving-cars-

Guo, H., Tang, J., & Su, Z. (2014). To be different, or to be the same? The interactive effect of organizational regulatory legitimacy and entrepreneurial orientation on new venture performance. *Asia Pacific Journal of Management*, *31*(3), 665-685. https://doi.org/10.1007/s10490-013-9361-9

Haboucha, C. J., Ishaq, R., & Shiftan, Y. (2017). User preferences regarding autonomous vehicles. Transportation Research Part C: Emerging Technologies, 78, 37-49. https://doi.org/https://doi.org/10.1016/j.trc.2017.01.010

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. European business review, 31(1), 2-24.

Hansen, H., Rand, J., & Tarp, F. (2009). Enterprise growth and survival in Vietnam: Does government support matter? The Journal of Development Studies, 45(7), 1048-1069.

Harcourt M, Lam H, Harcourt S. Discriminatory practices in hiring: Institutional and rational economic perspectives. International Journal of Human Resource Management 7 2005;16(11):2113-2132.

Hays, N. A., & Goldstein, N. J. (2015). Power and legitimacy influence conformity. Journal of Experimental Social Psychology, 60, 17-26.

Hevelke, A., & Nida-Rümelin, J. (2015). Responsibility for crashes of autonomous vehicles: an ethical analysis. Science and engineering ethics, 21(3), 619-630.

Hinderer, H., Stegmüller, J., Schmidt, J., Sommer, J., & Lucke, J. (2018). Acceptance of autonomous vehicles in suburban public transport. 2018 IEEE International Conference on Engineering, Technology and Innovation (ICE/ITMC).

Hsiao, C. H., & Yang, C. (2011). The intellectual development of the technology acceptance model: A co-citation analysis: SSIS. International Journal of Information Management, 31(2), 128. https://doi.org/http://dx.doi.org/10.1016/j.ijinfomgt.2010.07.003

Hudson, B. A., & Okhuysen, G. A. (2009). Not with a ten-foot pole: Core stigma, stigma transfer, and improbable persistence of men's bathhouses. Organization Science, 20(1), 134-153.

Human, S. E., & Provan, K. G. (2000). Legitimacy building in the evolution of small-firm multilateral networks: A comparative study of success and demise. Administrative Science Quarterly, 45(2), 327-365.

Humphreys A and Latour KA (2013) Framing the game: Assessing the impact of cultural representations on consumer perceptions of legitimacy. Journal of Consumer Research 40(4): 773–795.

Huong and Cuong (2018) Van Huong, V., & Cuong, L. K. (2019). Does government support promote SME tax payments? New evidence from Vietnam. Finance Research Letters, 31.

Jacqueminet, A., & Durand, R. (2020). Ups and Downs: The Role of Legitimacy Judgment Cues in Practice Implementation [Article]. *Academy of management journal*, *63*(5), 1485-1507. https://doi.org/10.5465/amj.2017.0563

Joel, A. C. B., & Powell, W. W. (1995). Cultivating an Institutional Ecology of Organizations: Comment on Hannan, Carroll, Dundon, and Torres. American Sociological Review, 60(4), 529-538. https://doi.org/10.2307/2096292

Johnson C, Dowd TJ, Ridgeway CL. Legitimacy as a social process. Annual Review of Sociology 2006;32:53-78.

Kapser, S., & Abdelrahman, M. (2020). Acceptance of autonomous delivery vehicles for last-mile delivery in Germany–Extending UTAUT2 with risk perceptions. Transportation Research Part C: Emerging Technologies, 111, 210-225.

Kaye, S.-A., Lewis, I., Forward, S., & Delhomme, P. (2020). A priori acceptance of highly automated cars in Australia, France, and Sweden: A theoretically-informed investigation guided by the TPB and UTAUT. Accident Analysis & Prevention, 137, 105441.

Khoury, T. A., Junkunc, M., & Deeds, D. L. (2013). The social construction of legitimacy through signaling social capital: Exploring the conditional value of alliances and underwriters at IPO. Entrepreneurship Theory and Practice, 37(3), 569-601.

Kim, K. (2019). Moderating effects of legitimacy on the liability- and R&D investment-innovation relationships in manufacturing SMEs. *Asian Journal of Technology Innovation*, *27*(1), 23-45. https://doi.org/10.1080/19761597.2019.1594321

Klyver, K., & Thornton, P. H. (2010). The cultural embeddedness of entrepreneurial self-efficacy and intentions: A cross-national comparison.

Korkmaz, H., Fidanoglu, A., Ozcelik, S., & Okumus, A. (2022). User acceptance of autonomous public transport systems: Extended UTAUT2 model. *Journal of Public Transportation*, *24*, 100013.

Krell, K., Matook, S., & Rohde, F. (2016). The impact of legitimacy-based motives on IS adoption success: An institutional theory perspective. Information & Management, 53(6), 683-697.

Lavieri, P. S., & Bhat, C. R. (2019). Modeling individuals' willingness to share trips with strangers in an autonomous vehicle future. Transportation Research Part A: Policy and Practice, 124, 242-261. https://doi.org/https://doi.org/10.1016/j.tra.2019.03.009

Li, J., Yang, F., Qi, J., Sun, R., & Geng, R. (2022). The influence of job satisfaction on entrepreneurial intention: a cross-level investigation. International Small Business Journal, 40(3), 385-402.

Lortie, J., Cox, K. C., & Roundy, P. T. (2022). Social impact models, legitimacy perceptions, and consumer responses to social ventures. Journal of Business Research, 144, 312-321. https://doi.org/https://doi.org/10.1016/j.jbusres.2022.01.079

Lovelace, R. (2023, February 1). Lawmakers pursue new rules of the road for driverless vehicles to win race against China. The Washington Times. https://www.washingtontimes.com/news/2023/feb/1/lawmakers-pursue-new-rules-road-driverless-vehicle/

Manfreda, A., Ljubi, K., & Groznik, A. (2021). Autonomous vehicles in the smart city era: An empirical study of adoption factors important for millennials. International Journal of Information Management, 58, 102050. https://doi.org/https://doi.org/10.1016/j.ijinfomgt.2019.102050

Madigan, R., Louw, T., Wilbrink, M., Schieben, A., & Merat, N. (2017). What influences the decision to use automated public transport? Using UTAUT to understand public acceptance of automated road transport systems. Transportation Research Part F: Traffic Psychology and Behaviour, 50, 55-64.

Malik, A. (2023, February 14). How close is widespread autonomous vehicle adoption? - Auto Service World. Auto Service World. https://www.autoserviceworld.com/how-close-is-widespread-autonomous-vehicle-adoption/

Morrison, G., & Belle, J.-P. V. (2020, 2020-01-01). Customer Intentions Towards Autonomous Vehicles in South Africa: An Extended UTAUT Model. 2020 10th International Conference on Cloud Computing, Data Science & Engineering (Confluence).

Meyer, J. W., & Rowan, B. (1977). Institutionalized organizations: Formal structure as myth and ceremony. American journal of sociology, 83(2), 340-363.

Nishitani, K., Unerman, J., & Kokubu, K. (2021). Motivations for voluntary corporate adoption of integrated reporting: A novel context for comparing voluntary disclosure and legitimacy theory. Journal of Cleaner Production, 322, 129027.

Palthe, J. (2014). Regulative, normative, and cognitive elements of organizations: Implications for managing change. Management and organizational studies, 1(2), 59-66.

Park, J., & Han, S. (2023). Investigating older consumers' acceptance factors of autonomous vehicles. Journal of Retailing and Consumer Services, 72, 103241.

Park, J., Hong, E., & Le, H. T. (2021). Adopting autonomous vehicles: The moderating effects of demographic variables. Journal of Retailing and Consumer Services, 63, 102687.

Parsons, T. (1960). Structure and process in modern societies.

Paker, F. (2022) Autonomous Vehicle Design in Lean Product Development Processes for Value Stream Map. *Journal of Transportation Technologies*, **12**, 744-777. doi: 10.4236/jtts.2022.124043.

Paul, K. J., Musa, M., & Nansubuga, A. K. (2015). Facilitating condition for E-learning adoption—Case of Ugandan universities. Journal of Communication and Computer, 12(5), 244-249.

Petter, S., Straub, D., & Rai, A. (2007). Specifying formative constructs in information systems research. *MIS quarterly*, 623-656.

Pfeffer, J., & Salancik, G. R. (1978). *The external control of organizations: A resource dependence perspective*. New York: Harper & Row.

Piao, J., McDonald, M., Hounsell, N., Graindorge, M., Graindorge, T., & Malhene, N. (2016). Public Views towards Implementation of Automated Vehicles in Urban Areas. Transportation Research Procedia, 14, 2168-2177. https://doi.org/https://doi.org/10.1016/j.trpro.2016.05.232

Pollack JM, Rutherford MW and Nagy BG (2012) Preparedness and cognitive legitimacy as antecedents of new venture funding in televised business pitches. Entrepreneurship Theory and Practice 36(5): 915–939.

Pollock, T. G., & Gulati, R. (2007). Standing out from the crowd: The visibility-enhancing effects of IPO-related signals on alliance formation by entrepreneurial firms. Strategic Organization, 5(4), 339-372.

Reddy, C. D. (2019). Cross-country start-up rates and formal incentives: a moderated mediation model of economic development and societal legitimacy. Problems and Perspectives in Management, 17(1), 297.

Rodríguez-Espíndola, O., Chowdhury, S., Dey, P. K., Albores, P., & Emrouznejad, A. (2022). Analysis of the adoption of emergent technologies for risk management in the era of digital manufacturing. Technological Forecasting and Social Change, 178, 121562. https://doi.org/https://doi.org/10.1016/j.techfore.2022.121562

Scott, W. (1995). Institutions and organizations: Sage Thousand Oaks. In: CA.

Semerci, A. B. (2020). The Role of Perceived Normative Legitimacy on the Growth Orientation of Women Entrepreneurs in Turkey [Article]. International Review of Entrepreneurship, 18(4), 519-536.

Serdar, C. C., Cihan, M., Yücel, D., & Serdar, M. A.. (2021). Sample size, power and effect size revisited: simplified and practical approaches in pre-clinical, clinical and laboratory studies. Biochemia Medica, 31(1), 27–53. https://doi.org/10.11613/bm.2021.010502

Soublière, J.-F., & Gehman, J. (2020). The Legitimacy Threshold Revisited: How Prior Successes and Failures Spill Over to Other Endeavors on Kickstarter. *Academy of management journal*, *63*(2), 472-502. https://doi.org/10.5465/amj.2017.1103

Souders, D., & Charness, N.. (2016). Challenges of Older Drivers' Adoption of Advanced Driver Assistance Systems and Autonomous Vehicles. In Declarative Agent Languages and Technologies X (pp. 428–440). Declarative Agent Languages and Technologies X. https://doi.org/10.1007/978-3-319-39949-2_41

Stoner, J. (2023, March 8). Autonomous Taxis Projected to Generate $4 Trillion in Revenue by 2027. Securities.io. https://www.securities.io/autonomous-taxis-projected-to-generate-4-trillion-in-revenue-by-2027/

Suchman, M. C. (1988). Constructing an institutional ecology: notes on the structural dynamics of organizational communities. annual meeting of the American Sociological Association. Atlanta,

Suchman, M. C. (1995). Managing Legitimacy: Strategic and Institutional Approaches. *The Academy of Management Review*, *20*(3), 571-610. https://doi.org/10.2307/258788

Suddaby, R., Bitektine, A., & Haack, P. (2017). Legitimacy. Academy of Management Annals, 11(1), 451-478.

Smyth, J., Chen, H., Donzella, V., & Woodman, R. (2021). Public acceptance of driver state monitoring for automated vehicles: Applying the UTAUT framework. Transportation Research Part F: Traffic Psychology and Behaviour, 83, 179-191.

Taeuscher, K., Bouncken, R., & Pesch, R. (2021). Gaining Legitimacy by Being Different: Optimal Distinctiveness in Crowdfunding Platforms. *Academy of management journal*, *64*(1), 149-179. https://doi.org/10.5465/amj.2018.0620

Thompson, M. (2023, February 1). Appen makes case for future of autonomous vehicles. Repairer Driven News. https://www.repairerdrivennews.com/2023/02/01/appen-makes-case-for-future-of-autonomous-vehicles/

Tornikoski, E. T., & Newbert, S. L. (2007). Exploring the determinants of organizational emergence: A legitimacy perspective. Journal of business venturing, 22(2), 311-335.

Tost, L. P. (2011). AN INTEGRATIVE MODEL OF LEGITIMACY JUDGMENTS. The Academy of Management Review, 36(4), 686-710. http://www.jstor.org/stable/41318091

Trevino, L. J., Thomas, D. E., & Cullen, J. (2008). The three pillars of institutional theory and FDI in Latin America: An institutionalization process. *International Business Review*, *17*(1), 118-133. https://doi.org/https://doi.org/10.1016/j.ibusrev.2007.10.002

Tsinopoulos, C., Sousa, C. M. P., & Yan, J. (2018). Process Innovation: Open Innovation and the Moderating Role of the Motivation to Achieve Legitimacy. *Journal of Product Innovation Management*, *35*(1), 27-48. https://doi.org/10.1111/jpim.12374

Venkatesh, V. (2000). Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. Information Systems Research, 11(4), 342-365.

Venkatesh, V., & Bala, H. (2008). Technology Acceptance Model 3 and a Research Agenda on Interventions. Decision Sciences, 39(2), 273-315. https://doi.org/10.1111/j.1540-5915.2008.00192.

Venkatesh, V., & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. Management Science, 46(2), 186-204. https://doi.org/10.1287/mnsc.46.2.186.11926

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS Quarterly, 425-478.

Venkatesh, V., Thong, J. Y., & Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. MIS Quarterly, 157-178.

Wu, K., Zhao, Y., Zhu, Q., Tan, X., & Zheng, H. (2011). A meta-analysis of the impact of trust on technology acceptance model: Investigation of moderating influence of subject and context type. International Journal of Information Management, 31(6), 572-581.

Wu, X., Zhao, Z., & Zhou, B. (2019). Legitimacy in adaptive business model innovation: An investigation of academic ebook platforms in China. Emerging Markets Finance and Trade, 55(4), 719-742.

Weber M. (1978). Economy and Society ed Roth, G., & Wittich, C. Berkeley: University of California Press.

Yuen, K. F., Huyen, D. T. K., Wang, X., & Qi, G. (2020). Factors Influencing the Adoption of Shared Autonomous Vehicles. International journal of environmental research and public health, 17(13), 4868.

Yuen, K. F., Wong, Y. D., Ma, F., & Wang, X.. (2020). The determinants of public acceptance of autonomous vehicles: An innovation diffusion perspective. Journal of Cleaner Production, 270, 121904. https://doi.org/10.1016/j.jclepro.2020.121904

Zhang, L., Yang, X., Zhu, S., & Xia, Z. (2023). Business Model Innovation and Performance of Startups: The Moderating Role of External Legitimacy. Sustainability, 15(6), 5351.

Zimmerman, M.A. & Zeitz, G.J. (2002) Beyond survival: Achieving new venture growth by building legitimacy. Academy of Management Review 27(3): 414–431.

Zucker, L. G. (1977). The Role of Institutionalization in Cultural Persistence. American Sociological Review, 42(5), 726-743. https://doi.org/10.2307/2094862

APPENDIX

Proposed Survey

Demographic
1. How old are you?
2. Do you have a driver's license?
3. Do you currently live in Jacksonville, NC?
4. Which gender do you identify as?
5. Have you ever used an autonomous vehicle?

Regulatory Legitimacy
R1. Autonomous vehicles are authorized by the government (adapted from Guo et al., 2013).
R2. Autonomous vehicles are highly appraised by the government (adapted from Guo et al., 2013).
R3. Autonomous vehicles conform to policies, rules, and regulations (adapted from Guo et al., 2013).
R4. Autonomous vehicles correspond to the governments' thinking of possible policy adjustments (adapted from Guo et al., 2013).
R5. Autonomous vehicles are becoming industry norms recommended by the governments (adapted from Guo et al., 2013).
R6. Autonomous vehicles follow government regulations for operating procedures in the automotive industry (adapted from Elsbach, 1994).

Normative Legitimacy (adapted from Elsbach, 1994)
N1. The general public approves of Autonomous vehicles.
N2. The community supports Autonomous vehicles.
N3. Most of the community members would recommend Autonomous vehicles to their friends.
N4. Autonomous Vehicle manufacturers are committed to meeting automotive industry standards in their production operations.
N5. Most community members would continue using Autonomous vehicles even if they could get another vehicle from any other manufacturer in the automotive industry.
N6. Autonomous vehicle manufacturers are concerned with meeting acceptable standards for environmental protection, safety, and human welfare.
N7. Autonomous vehicles are viewed by business writers as one of the top technologies in the automotive industry.
N8. Autonomous Vehicle manufacturers' leaders believe in "playing by the rules" and following accepted operating guidelines.

Cognitive Legitimacy
C1. Autonomous vehicles are normal vehicles for this industry (adapted from Bitektine et al., 2020).
C2. Autonomous vehicles are vehicles typical of its industry (adapted from Bitektine et al., 2020).
C3. Autonomous vehicles are similar to others in its industry (adapted from Bitektine et al., 2020).

C4. It is normal to have autonomous vehicles like these in society (adapted from Bitektine et al., 2020).

C5. Most consumers in the general public approve of autonomous vehicles operating practices (adapted from Elsbach, 1994).

Performance expectancy (adapted from Venkatesh et al., 2012)

PE1. I would find autonomous vehicles useful in my everyday life.

PE2. Using autonomous vehicles to travel could help me to achieve things that are important to me.

PE3. Using autonomous vehicles could help me reach my destination more quickly.

PE4. Using autonomous vehicles could increase my productivity.

Effort expectancy (adapted from Venkatesh et al., 2012)

EE1. Learning to use an autonomous Vehicle will be easy for me.

EE2. My interaction with autonomous vehicles will be clear and understandable.

EE3. I would find autonomous vehicles easy to use.

EE4. It will be easy for me to become skillful at using autonomous vehicles.

Social influence (adapted from Venkatesh et al., 2012)

SI1. People who are important to me think that I should use autonomous vehicles.

SI2. People who influence my behavior think that I should use autonomous vehicles.

SI3. People whose opinions I value would like me to use autonomous vehicles.

SI4. In general the authority would support the use of autonomous vehicles.

Facilitating conditions (adapted from Venkatesh et al., 2012)

FC1. I have the resources necessary to use autonomous vehicles.

FC2. I have the knowledge necessary to use autonomous vehicles.

FC3. Autonomous vehicles are compatible with other forms of transportation I use.

FC4. I can get help from others if I have difficulties using autonomous vehicles.

Hedonic motivation (adapted from Venkatesh et al., 2012)

HM1. Using autonomous vehicles could be fun.

HM2. Using autonomous vehicles could be entertaining.

HM3. Using autonomous vehicles could be enjoyable.

Behavioral intention (adapted from Venkatesh et al., 2012)

BI1. I intend to use autonomous vehicles in the future.

BI2. I would use autonomous vehicles in my everyday life.

BI3. I would use autonomous vehicles frequently.