CHALMERS
UNIVERSITY OF TECHNOLOGY

Providing Women with Technology in Rural Areas of Sub-Saharan Africa

A case study exploring the acceptance, usage, and effects of Electric Tricycles among Rural Women in Zimbabwe

Master's thesis in Management and Economics of Innovation, and Quality and Operations Management

ALVA JANSSON
FANNY SÖDERLING

DEPARTMENT OF TECHNOLOGY MANAGEMENT AND ECONOMICS
DIVISION OF ENTREPRENEURSHIP AND STRATEGY

CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden 2024
www.chalmers.se

Master's thesis 2024

Providing Women with Technology in Rural Areas of Sub-Saharan Africa

A case study exploring the acceptance, usage, and effects of Electric Tricycles among Rural Women in Zimbabwe

ALVA JANSSON
FANNY SÖDERLING

Department of Technology Management and Economics
Division of Entrepreneurship and Strategy
Chalmers University of Technology
Gothenburg, Sweden 2024

Providing Women with Technology in
Rural Areas of Sub-Saharan Africa
A case study exploring the acceptance, usage, and effects of Electric Tricycles among Rural Women in Zimbabwe
ALVA JANSSON
FANNY SÖDERLING

Supervisor: Ida Eyi Heathcote-Fumador, Technology Management and Economics
Examiner: Robin Teigland, Technology Management and Economics

Department of Technology Management and Economics
Chalmers University of Technology
SE-412 96 Gothenburg
Sweden
Telephone +46 31 772 1000

Cover:
Women in Zimbabwe traveling on the electric tricycle called "Hamba" (Mobility for Africa, 2021).

Gothenburg, Sweden 2024

Providing Women with Technology in Rural Areas of Sub-Saharan Africaa
A case study exploring the acceptance, usage, and effects of electric tricycles among Rural Women in Zimbabwe

ALVA JANSSON
FANNY SÖDERLING

Department of Technology Management and Economics
Chalmers University of Technology

Abstract

This study explores the adoption and usage of solar-powered electric tricycles, known as Hamba, among rural women in Zimbabwe provided by the local company Mobility for Africa. Through a field study in rural Zimbabwe and the application of the extended Unified Theory of Acceptance and Use of Technology (UTAUT2), the research identifies factors influencing technology acceptance and usage in rural sub-Saharan Africa.

The research aims to understand adoption, usage, and effects addressing three research questions: (1) What factors influence the adoption and usage of electric tricycles for women in Zimbabwe? and (2) How do these factors influence the adoption and usage of electric tricycles for women in Zimbabwe? (3) What effects on women and society can be seen from the implementation of electric tricycles?

The results emphasize that several factors influence adoption and usage but to varying degrees. Performance expectancy, social influence, and price value are the most influential. In contrast, only facilitating conditions, hedonic motivation, social influence, and habit influence usage, with the first two having the greatest influence. In addition, the findings indicate that three additional factors, not included in the existing UTAUTU2 framework, influence the adoption and usage. These factors are knowledge, trust, and the effects in society. Where the two former are seen as influences from the technology provider. Further, the study reveals that introducing the Hamba led to notable improvements in income, social status, health, and independence for rural women, alongside broader community benefits such as enhanced school attendance and reduced gender-based violence.

Based on the findings, the research underscores the necessity for customized business models combined with strategies to build trust and knowledge to foster sustainable technology adoption and usage. These insights offer practical implications to for-profit companies and technology providers aiming to enhance mobility solutions for women in similar contexts, ultimately contributing to inclusive socio-economic development and gender equality in rural communities.

Keywords: electric tricycles, gender equality, long-term sustainable technology, rural mobility, rural development, sub-Saharan Africa, technology acceptance, technology adoption, technology usage, UTAUT2.

Acknowledgements

This master's thesis was conducted during the spring of 2024 at the Department of Technology Management and Economics, under the Division of Entrepreneurship and Strategy at Chalmers University of Technology. The project was carried out with the Zimbabwean company Mobility for Africa.

Firstly, we are deeply grateful to the staff of Mobility for Africa for their warm embrace and consistent cooperation during our 8-week stay in Harare, Zimbabwe, and for guiding the visits to the rural areas. Special thanks go to Shantha Bloemen for her openness to our collaboration with Mobility for Africa and for her continuous inspiration through her drive and ambition. We are also deeply thankful to Amelia Wilson for her timely assistance and unwavering support from the beginning of our research to the end.

We would also like to thank the Kullman family and the Global Mentorship Program, for the financial and practical support that made our travel and research in Zimbabwe possible. We are also grateful to Kristina Henricson Briggs, in charge of the program, who ensured everything ran smoothly during the field study. We are furthermore grateful to our two mentors, Carl-Adam Hellqvist and Fredrik Elieson whose advice and encouragement have been indispensable.

Special thanks to our opponents for their insightful feedback, to Qred AB for showing faith in our research and providing us with additional financial support, and to everyone else who has encouraged us to believe in our work and supported us along the way. This encouragement has been a source of motivation and strength.

Lastly, we would like to extend our warmest thanks to our supervisor, Ida Eyi Heathcote-Fumador, for her support, valuable feedback, and encouragement throughout the research process. In addition, we are grateful to our examiner, Robin Teigland, for her feedback, and encouragement. Their support and insights have been crucial to the success of this project.

Thank you all for making this research possible and for your continued support and belief in our work.

Alva Jansson, Gothenburg, June, 2024
Fanny Söderling, Gothenburg, June, 2024

List of Terminology

Below is the list of Terminology that have been used throughout this thesis:

Community Engagement	In this case, community engagement refers to MFA's strategic approach to engaging with potential clients in Zimbabwe's rural communities. This includes building relationships, developing communications, and managing interactions to attract new clients to apply.
Growth Point	Trading center/Marketplace, where people meet to trade, buy, and sell products, animals, and so on.
Hamba	The name of the electrified tricycles sold by Mobility for Africa. Hamba Means "go ahead" in the local Ndebele language.
Last Mile	This is the last leg of a journey comprising the movement of passengers and goods from a transportation hub to a final destination.
Lease-to-Purchase	Allows someone to rent a property or product for a specified period with the promise to purchase it at the end of the lease term.
Mobility	The transport means available - both motorized and non-motorized - for people to transport themselves and their goods, and for services to be provided.
Mushikashika	A taxi service where several people can be collected and dropped off at different destinations.
Peri-urban Areas	Areas on the outskirts of cities. They are characterized by rapid development, diverse land use, high population density, and influenced by urban growth.

Round Table	When a group of people lend money to each other in a circle. In turn, everyone lends money to one person in the group, allowing that person to make larger investments.
Rural Areas	A rural area is an open swath of land which has few homes or other buildings and not very many people.
Semi-rural Areas	Areas between rural and suburban regions. They are characterized by low population density, some agriculture, mixed land use, and limited infrastructure.
Smallholder Farmers	Farmers who manage farming under a small-scale agriculture model, varying from less than one hectare to 10 hectares.
Sub-Sahara	The area and regions of the continent of Africa that lie south of the Sahara. These include Central Africa, East Africa, Southern Africa, and West Africa.
Urban Area	An urban area includes the city itself, as well as the surrounding areas.

Abbreviations

E-mobility	Electrical Mobility
MFA	Mobility for Africa
NGO	Non-Governmental Organization
ODK	Open Data Kit
RE	Renewable Energy
SMEs	Small and Medium-sized Enterprises
T&L	Transport and Logistics
UTAUT	Unified Theory of Acceptance and Use of Technology
UTAUT2	The Extended Unified Theory of Acceptance and Use of Technology

Contents

List of Figures

1
Introduction

This chapter provides a background to the thesis and highlights the importance of inclusive development, technology acceptance, and mobility. Subsequently, it introduces the aim of the research, as well as the research questions that have guided the research. Lastly, the research setting will be further explained, clarifying the research limitations.

1.1 Background

Developing underdeveloped countries is essential for reducing global poverty, improving health and education, and promoting economic stability. However, interventions in these contexts are challenging and require tailored approaches considering local conditions and constraints (United Nations Development Programme, 2019). In addition, as underscored by Goal 8 of the Sustainable Development Goals presented by the United Nations (2023), economic growth alone does not necessarily imply that it is inclusive and sustainable. Hence, solely developing a country by increasing its economy, does not necessarily eliminate gender disparities (Duflo, 2012). More specifically, women are seldom prioritized in this growth, indicating that actions must be taken consciously to ensure that everyone, including women, can benefit from economic growth and development.

According to the European Union (2023), technology is key for enabling development, where transportation technologies are especially emphasized. Without reliable transportation, it is difficult for people to access education, job opportunities, or even basic services like healthcare. Hence, good roads and ways to get around are crucial for development.

1.1.1 Mobility and gender issues in sub-Saharan Africa

In rural sub-Saharan Africa, the daily struggle for mobility is a profound reality for many people, as many rural areas lack adequate transport infrastructure, making walking the main way to get around (Porter, 2002). According to Porter (2002), this situation has serious consequences for individuals health and economy. In rural Zimbabwe, this issue is particularly pressing, where residents often travel more than 5 km to reach the nearest primary school or health facility, navigating roads that have far exceeded their intended lifespan (Zimbabwe Vulnerability Assessment Committee, 2023).

In this challenging environment, women bear a particularly strong burden, as they are usually the ones responsible for transporting water, firewood, and agricultural products over long distances. All this is done by foot while carrying the products on their heads. This practice, known as 'head-loading' and seen in Figure 1.1, has further serious health consequences, including musculoskeletal injuries and risks to maternal health. Studies show that women in sub-Saharan Africa can spend over four hours a day on transportation activities alone, carrying loads weighing up to 60 kg (Porter, 2002).

Figure 1.1: Woman carrying firewood using head-loading (Mobility for Africa, 2021).

In addition, rural women in these areas are usually highly reliant on small trade as their main source of income (Bugaje, 2023). Therefore, access to reliable transportation can strengthen women's economic position by enabling them to participate more effectively in small-scale trade and access markets more efficiently. Hence, increased mobility can significantly increase women's income and improve their contribution to household and community welfare.

However, Zhao and Yu (2020), points out that in undeveloped rural regions with poor transport solutions, women are the ones experiencing the lowest levels of mobility. Cultural norms and safety concerns enhance the barriers to women's access to appropriate transportation solutions (Bishop et al., 2018; Chikweche et al., 2023). Both motorcycles and bicycles, which could be seen as effective tools for poor rural roads, are often considered unsafe or unsuitable for women due to societal perceptions and safety risks. Consequently, women are left without viable transportation

options, restricting their economic and social participation (Bugaje, 2023). Therefore, addressing gender disparities in the transport sector can contribute to greater gender equality and social inclusion.

1.1.2 Electric tricycles show a great opportunity in addressing mobility challenges

Tricycles are considered more suitable for women, making their design more inclusive (Chikweche et al., 2023). Electric tricycles represent a promising alternative for mobility challenges faced in rural areas in sub-Saharan Africa, and these vehicles are already growing popular in countries such as the Philippines and India, where they have been widely developed and commercialized (Balaria et al., 2017, Voa News, 2023; Qiu et al., 2022).

Furthermore, in rural China, electric tricycles have become the most popular means of transportation (Qiu et al., 2022). In these rural areas, electric tricycles have proven invaluable for a variety of activities, as they do not rely on supporting infrastructure to the same extent as larger vehicles, thereby increasing their demand. The electric tricycles are used for picking up children from school, transporting produce from farms to markets, and traveling between markets and croplands.

The more suitable design combined with its application of use suggests that electric tricycles could revolutionize rural mobility in sub-Saharan Africa, especially for women. This, in turn, could lead to better economic outcomes and improved quality of life for rural communities, which could contribute to sustainable and inclusive development. However, there is limited research focusing on the specific needs and preferences of women's technology acceptance. Moreover, most of the technology acceptance literature focuses on urban areas in already technically developed countries. Thus highlighting a significant gap that needs to be addressed in the technology acceptance theory.

1.1.3 Problematization and research focus

The development of underdeveloped countries is crucial for reducing global poverty. However, such development efforts face significant challenges, particularly in rural areas where infrastructure is scarce, affecting women the most.

Women are further the ones who experience the least mobility, which is compounded by cultural norms and safety concerns that restrict their access to effective transportation options, like motorcycles. Additionally, the adoption of other technology, such as electric tricycles, remains low among women due to limited research and targeted interventions.

Therefore, addressing the intersection of these issues — the need for development actions, poor rural infrastructure, gender disparities in mobility, and the gap in research on women's technology adoption — forms the core focus of this research.

This intersection is further illustrated in Figure 1.2.

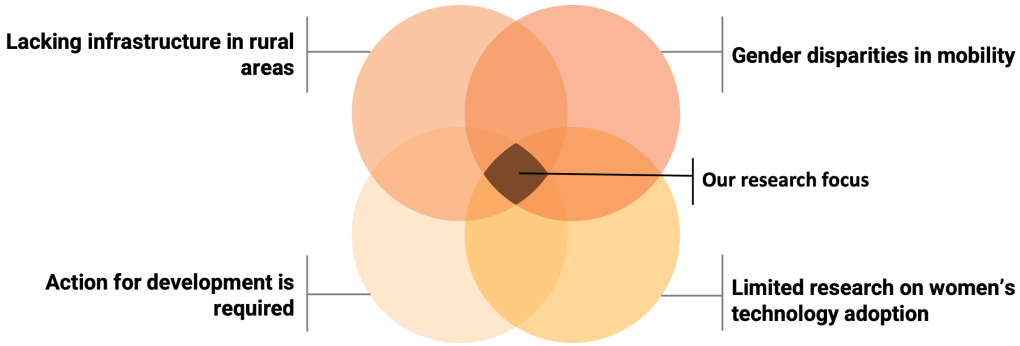

Figure 1.2: The focus in this research lies in the intersection of the areas presented in the background, as these areas are important cornerstones in addressing rural women's development.

1.2 The aim of the study

Building upon the problematization outlined in subsection 1.1.3, the research will investigate the adoption, usage, and effects of solar-powered electric tricycles among rural women in sub-Saharan Africa. Through a case study in Zimbabwe, the research aims to *increase the understanding of what influences rural women in Zimbabwe to adopt and use a specific technology.* Further, by focusing on gender-specific challenges and potential solutions, the research aims to *highlight the importance of empowering women through technology solutions*, ultimately fostering a more developed and inclusive society.

To decompose the aim, the following research questions have been developed:

- *What factors influence the adoption and usage of electrical tricycles for women in Zimbabwe?*
- *How are these factors influencing the adoption and usage of electrical tricycles for rural women in Zimbabwe?*
- *What effects on women and society can be seen from the implementation of electric tricycles?*

By answering these research questions, the report offers theoretical insights into the theory of technology acceptance in a rural context as well as the theory about empowering women. Furthermore, the research provides practical insights to for-profit companies, and technology providers who want to provide technology for rural women in a developing context.

1.3 Research settings

The research questions have been limited to solar-powered e-tricycles in rural areas of Zimbabwe as this research was conducted in collaboration with a single case company, Mobility For Africa, from now on referred to as MFA. MFA delivers tailored e-mobility solutions to communities, and especially women, in rural and peri-urban areas of Zimbabwe by providing solar-powered batteries and e-tricycles, called "Hamba". The data collection was carried out in the different rural areas of Zimbabwe where MFA has its operations. Hence, this constrains the sampling frame.

1.4 Limitations and delimitaions

A notable limitation of this research was the language barrier. The predominant language spoken by participants in the visited rural areas of Zimbabwe was Shona. Although many people knew English, it became evident that they had greater confidence and proficiency in expressing themselves in their native tongue. As a consequence, the research team needed to rely on the translation from the local staff of MFA to facilitate communication during the data collection. The language barrier also limited spontaneous and flexible conversations with people in rural areas. By trying to learn some phrases in Shona and by speaking with the local people who understood English when opportunities were given, the researcher managed to mitigate this limitation.

Additionally, translating the data from Shona to English posed the risk of losing meaning or misinterpretation, as some words or phrases may lack direct translations. Translators may also have faced challenges in accurately conveying cultural references or context-specific expressions. Moreover, translators might have unintentionally introduced biases, affecting how questions were interpreted and responses were communicated. To mitigate these misinterpretations and biases, good communication between the researchers and the translator was therefore incorporated during the whole data collection process.

Another limitation of this research was that all participants were either customers of the collaborating company, MFA, or had been in contact with MFA. Therefore, the research lacks contrasting opinions from people unfamiliar with MFA or who showed dislike for the company. Further, this has led to the result being influenced by the positive responses about MFA and the Hamba, and little information is stated about negative responses. Moreover, as the research only investigated what influenced women who had little previous experience with other technologies within the transport sector, comparing different genders and experiences was not seen as relevant to the aim. Even if some consideration was taken to the male participants and male interviewees, the results are mainly analyzed from the perspective of inexperienced women.

2
Theoretical background

In this chapter, the theoretical background of the research will be presented. Firstly, a section explaining the framework laying the foundation for this research, Venkatesh's Extended Unified Theory of Acceptance and Use of Technology (UTAUT2), will be presented (Venkatesh et al., 2012). Subsequently, previous applications of the framework in developing countries will be examined.

Lastly, a deepening examination of gender theory in the context of economic development will be presented. An overview of existing literature on gender disparities, gender roles, and opportunities across genders will be provided.

2.1 Technology acceptance and technology use within a customer use context

UTAUT2 is a framework introduced by Venkatesh et al. (2012) explaining technology acceptance and technology use within a customer use context. The model builds on the previous UTAUT model introduced by Venkatesh et al. (2003), which in contrast to UTAUT2 does not consider the customer use context but instead has an organizational approach.

The UTAUT2 model consists of the seven key constructs *performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value,* and *habit* that are moderated by the three different factors *age, gender*, and *experience*. These seven key constructs play an important role in influencing customers' behavioral intentions to use a specific technology, what we call adoption, and in some cases also the use of the technology.

Over the years, Venkatesh's models have been frequently used to understand technology acceptance in different contexts. However, a literature review on the UTAUT research made by Williams et al. (2015), found that out of the 178 studies examined, a total of 155 (87 percent) used surveys as their main data collection, and only 3 (1.6 percent) used a field study to conduct their result (Williams et al., 2015). Castanha et al. (2020) who did a literature review solely on the newer version, UTAUT2, show that even this model is used mostly in quantitative studies. This highlights the need for more studies that examine the framework through qualitative methods, which can bring new depth and meaning to the constructs.

2.1.1 The seven constructs of UTAUT2

Venkatesh et al. (2012) define the seven constructs and describe their relation to behavioral intention and use behavior as the following:

1. **Performance expectancy** is the degree to which an individual believes that a specific technology will provide benefits when performing certain activities. This construct is seen as the strongest predictor of the behavioral intention to use a specific technology as it is tied to the utility of technology. If using a technology will give an individual benefits, the individual is more likely to use the technology.

2. **Effort expectancy** is the believed degree of ease associated with consumers' use of a specific technology. If a technology is considered easy to understand and use the intentions of an individual to use a technology may be positively affected.

3. **Social influence** is the extent to which consumers perceive important people around them (e.g., family, friends, or leaders) believe they should use a particular technology. If a technology is considered negative by society and an individual is strongly influenced by society's views, this can influence the individual's intention to use the technology.

4. **Facilitating conditions** refer to consumers' perceptions of the resources and support available to a specific technology. This construct both influences the intention of an individual to use the technology, but also the specific behavior when using it. If an individual believes that there is a lack of support from the infrastructure they consider necessary for the technology to work, this may influence the individual's intention to use the technology. Further, people who are using the technology may adopt their usage to fit the infrastructure.

5. **Hedonic motivation** is defined as the fun or pleasure an individual derives from using a specific technology. If someone gets excited about using the technology, this can in turn influence their intention to use the technology. This construct is argued to play an important role in determining both the acceptance and the use of technology from a consumer context.

6. **Price value** refers to the perceived advantages derived from utilizing a specific technology concerning the monetary expenses incurred. Hence, an individual determines this value by weighing the impact of purchasing costs against the quality of the technology. In essence, when the benefits of using the technology outweigh the monetary costs, the price value is seen as positive, and this further positively influences the intentions to use the technology.

7. **Habit** is defined as the extent to which people tend to perform behaviors automatically due to learned patterns. Thus, this is closely linked to the experience with a specific technology. Previous use is seen to be a strong

predictor of future use. Hence, when moving from the initial acceptance to the actual use of a new technology it becomes important to consider the habit of an individual.

As seen in Figure 2.1, all seven constructs influence the behavioral intention of an individual to use a specific technology. This behavioral intention together with facilitating conditions and habit then determines how the individual will use the technology, i.e. the user behavior.

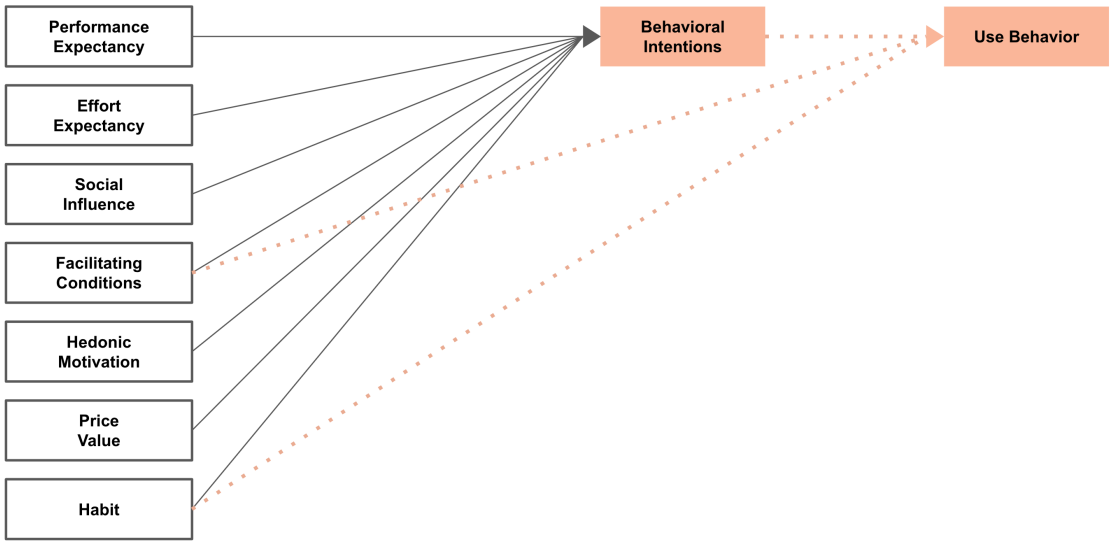

Figure 2.1: The seven key constructs in the UTAUT2 model presented by Venkatesh et al. (2012) and their influence on behavioral intentions and user behavior.

2.1.2 Age, gender, and experience and how they moderate the constructs

According to Venkatesh et al. (2012), the seven constructs are moderated in different ways by age, gender, and experience of the individual. Where, experience reflects the individual's opportunity to use a specific technology, and is typically operationalized as the passage of time from the initial use of a specific technology by an individual. In other words, experience can be seen as a spectrum. Due to this, the experience can be described and categorized in different ways, e.g., by different levels or periods of experience (Venkatesh et al., 2012).

The different moderators and the constructs are shown in Figure 2.2. As seen, age and gender moderate all of the constructs, while experience moderates everyone except performance expectancy. Besides this, experience also moderates the effect of behavioral intentions on use behavior.

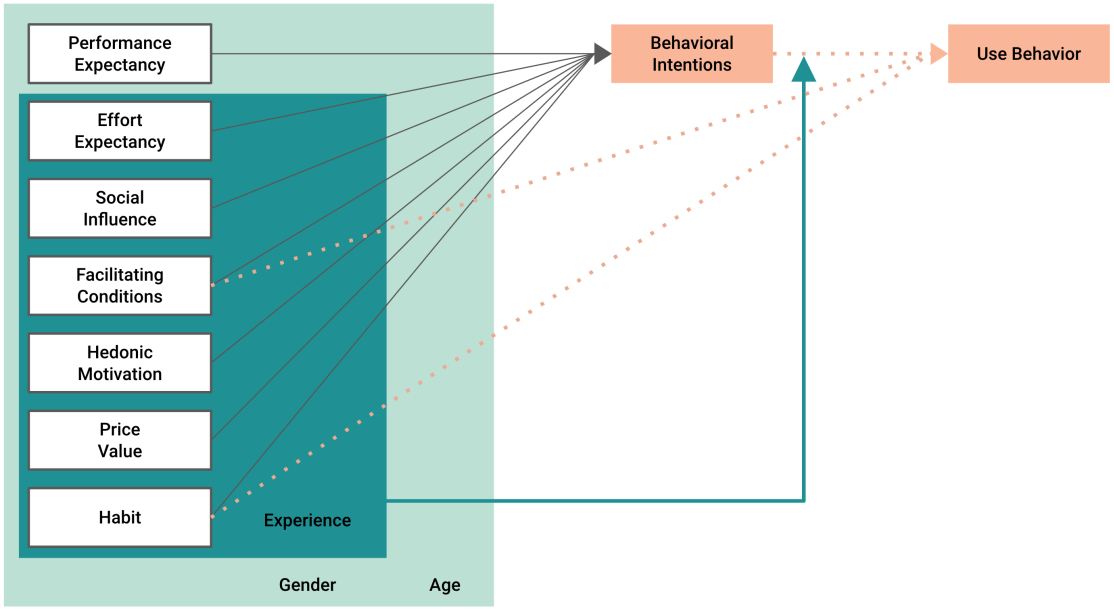

Figure 2.2: Age and gender influence all of the seven constructs in the UTAUT2 model presented by Venkatesh et al. (2012), while experience does not influence performance expectancy.

This moderating nature of age, gender, and experience implies that the effect and importance of the different constructs on an individual's intention to adopt and use a specific technology will differ as the variable changes (Venkatesh et al., 2012).

For example, Venkatesh et al. (2012) describes that inexperienced people seem to make higher requirements for a rigid infrastructure. In addition, elder individuals often prioritize support availability, due to challenges in processing complex information. Furthermore, women tend to rely more on facilitating conditions as they often view the availability of resources, knowledge, and support as essential for them to accept a new technology. According to Venkatesh et al. (2012), the latter could be connected to gender roles and the fact that task-oriented behavior is more common among men. On the opposite, Venkatesh et al. (2012) explains that a greater experience implies increased knowledge about the technology, which can mitigate the impact of facilitating conditions. All this indicates, however, that older inexperienced women are the ones who rely most on facilitating conditions in their intention to adopt and use a technology.

In the case of hedonic motivation, a little experience can according to Venkatesh et al., 2012 have a positive influence on adopting a technology, as the novelty of the technology might lead to an increased interest in using it. More specifically this implies that consumers initially are drawn to the novelty of a technology, but as experience grows, pragmatic considerations become more important and the effect of this construct is lowered.

In addition, both gender and age have been shown to play an important part in how

price value influences the intention to adopt a technology (Venkatesh et al., 2012). For instance, men and women tend to have different approaches to decision-making and purchasing behavior. Men often exhibit traits of independence and competitiveness, making decisions based on selective information and heuristics. In contrast, women tend to be more interdependent and cooperative, considering a wider range of details in their decision-making process. Venkatesh et al. (2012) argue that these differences in behavior can be attributed to the societal roles and expectations placed on men and women. Women, traditionally tasked with managing family finances and being more involved in purchasing decisions, tend to exhibit greater cost consciousness and responsibility. This tendency is expected to intensify with age, as older women become even more sensitive to price. In addition, Venkatesh et al. (2012) mentions that men are more likely to explore technology, which may lead them to value technology more than women. As a result, the effect of price value on the intention to adopt technology will be stronger among women, particularly older women.

When it comes to habit, younger women with little experience with technology might pay more attention to what's happening around them and make decisions based on that, rather than just doing what they always do (Venkatesh et al., 2012). In contrast, older men who have more experience often seem to rely more on previous habits implying that habit plays a more important role in both the intentions and use of the new technology.

2.2 Using UTAUT2 in a developing context

One important limitation highlighted by Venkatesh et al. (2012) is that the UTAUT2 model mostly has been applied in the context of a technologically advanced country. However, as this research focuses on technology acceptance in developing rural areas in Zimbabwe, it is vital to understand how the framework could and has been implemented in other developing contexts. Therefore, five studies explicitly stated that they use UTAUT2 in a developing country have been examined. Out of these, two of the studies were conducted in Africa and two other studies focused explicitly on women. In the text below, each study has further been decomposed into its findings on the UTAUT2 constructs, and an overview of the studies with their findings can be found in Table 2.1.

Authors	Apfel and Herbes (2021)	Addy et al. (2023)	Gharaibeh et al. (2018)	Manrai et al. (2021)	Dutta and Shivani (2020)
Context	Investigate the dimensions for Renewable energy adoption among Senegalese SMEs.	Identify the factors that facilitate the adoption of an e-procurement system in Ghana.	Investigate the determinants that affect the adoption of mobile banking services in Jordan.	Investigates the adoption of digital payments by semi-rural women in India.	Examine the determinants that induce intention to accept and use e-commerce among women entrepreneurs in India.
Method	Qualitative	Quantitative	Qualitative	Quantitative	Quantitative
Performance Expectancy	Significant influence	Significant influence	Significant influence	Significant influence	Significant influence
Effort Expectancy	Some influence	No influence	Significant influence	Significant influence	Significant influence
Social influence	No influence	Significant influence	Significant influence	Significant influence	Significant influence
Facilitating conditions	Significant influence	Some influence	Significant influence	Significant influence	Significant influence
Hedonic motivation	N/A	No influence	No influence	No influence	No influence
Price value	Significant influence	No influence	N/A	No influence	Significant influence
Habit	N/A	Negative influence	N/A	N/A	Some influence
Additional constructs	Knowledge Communication channels	N/A	Trust Communication channels	Self Determination Theory	Individual innovativeness Achievement motivation

Table 2.1: Summary of the five presented research studies that are using UTAUT2 for understanding technology acceptance in a developing country.

Performance expectancy

For each study investigated, performance expectancy was found to have a positive and strong influence on the adoption of new technology among the participants. However, the studies found different underlying beliefs that enhanced the technology adoption for their specific context. Apfel and Herbes (2021) conclude that beliefs such as decreased costs and enhanced business operations had a positive influence on the adoption of renewable energy (RE) technologies in Senegal. In Addy et al. (2023) and Gharaibeh et al. (2018) research, participants' belief that e-procurement could enhance their efficiency and productivity drove the incentives to adopt the technology. This was also the case in Dutta and Shivani (2020) research, which mainly focused on women. Here, the researchers conclude that the women's belief in the technology's ability to improve their businesses in terms of growth, efficiency, and productivity, had a strong influence on their intention to adopt.

Effort expectancy

Effort expectancy is shown to have a strong influence in most cases, where several researchers conclude that users are more likely to adopt a technology if it is considered easy to use (Gharaibeh et al., 2018; Dutta and Shivani, 2020; Manrai et al., 2021). Manrai et al. (2021), who saw this effort expectancy as strong for women adopters in India, therefore state that a way to increase the adoption rates of a technology is by marketing the technology in a way that highlights the ease of use. Furthermore, Manrai et al. (2021) state that by including more training and help to the women on how to properly use digital payments, the adoption might increase as well. This is further highlighted by Dutta and Shivani (2020), who stress the need for targeted campaigns to enhance the perceived value and ease of use of e-commerce among women entrepreneurs. The researchers further underscore the importance of creating an enabling environment that supports technology use through adequate infrastructure, training, and mentorship programs.

In contrast to the other studies, Apfel and Herbes (2021) state that effort expectancy only had some influence on the adoption of renewable technologies among their participants. However, they underscore that it is difficult to conclude, as there was a prevalent belief among the participants that RE technologies are easy to implement, despite potential complexities. The authors further conclude that a reason for the perceived ease of use could be due to a lack of knowledge about the technology, which made this construct seem less important. Furthermore, Addy et al. (2023) conclude that effort expectancy did not influence the adoption, but without elaborating it further.

Social influence

For social influence, all studies conclude that it has a significant positive effect on the intentions to adopt a technology, except for Apfel and Herbes (2021) who say that the decision is driven among the small and medium-sized enterprises (SMEs) in Senegal was solely by individual values. The social influence's impact in the other studies is further shown to come mainly from friends and family, but in some cases, external actors and the community had a vital influence (Gharaibeh et al., 2018;

Manrai et al., 2021; Dutta and Shivani, 2020; Addy et al., 2023). For example, Dutta and Shivani (2020) conclude that the community's and family's opinions strongly impacted the decision to adopt e-commerce among women entrepreneurs in India. Gharaibeh et al. (2018) are also enhancing family as an important influence, but are further highlighting that recommendations from a trusted actor can enhance the adoption. Addy et al. (2023) builds on this by also stating that influential individuals seem to have had a strong impact on the adoption of e-procurement systems in Ghana.

Facilitating conditions

Facilitating conditions, such as rigid infrastructure and support systems, are consistently recognized across all studies as an important factor influencing the adoption, but also usage of various technologies. Addy et al. (2023) builds on this further by stating that facilitating conditions are crucial as they ensure that users have the necessary resources, knowledge, and support to use the technology effectively. In contrast to what Venkatesh finds about elderly people and facilitating conditions, Dutta and Shivani (2020) does not find that the elderly women in their study relied more on facilitating conditions than the other women. This indicates, that in the context of a developing country, facilitating conditions is important no matter age.

Hedonic motivation

Unlike the other constructs mentioned, hedonic motivation was found to be insignificant in all the investigated studies and was not even mentioned in the study of Apfel and Herbes (2021). The overall conclusion for the low influence seems to be that when adopting new technology in a developing context, other aspects such as the functional benefits and ease of use outweigh the importance of enjoyment or pleasure derived from it.

Price value

In the cases of Dutta and Shivani (2020) and Apfel and Herbes (2021), price value had a significant positive influence on adopting e-commerce and renewable energy technologies. Here, the participants considered the cost-benefit ratio, and if the benefits outweighed the costs, they were more likely to adopt. Interestingly, the other studies showed that price value was insignificant and that the participants seemed to not consider price as such an important determinant when adopting (Gharaibeh et al., 2018; Manrai et al., 2021; Addy et al., 2023).

Habit

Similar to hedonic motivation, the habit was barely mentioned or seemed to have a low influence in the investigated studies. In Addy et al. (2023) study, habit is mentioned to have a negative influence on adoption, meaning that earlier habits could affect the intention to adopt e-procurement negatively. However, its influence is still seen as quite low. On the other hand, Manrai et al. (2021) conclude the opposite, which is that habit had a positive influence on the adoption of digital payment technologies by semi-rural women. In this case, the study showed that

the intention to adopt was higher if the women already had earlier experience in similar technologies, hence they had habits that fitted well with the new technology. This indicates that habit seems to have some influence in a development context, but depending on if the habit fits with the new technology or not will decide if it influences negatively or positively.

Other constructs

In some of the studies, other constructs were elaborated to play a vital role in technology acceptance in a developing context. All added constructs, except for the ones found by Gharaibeh et al. (2018), can be seen in the extended frameworks originating from the studies in Figure 2.3. Furthermore, the added constructs, which were seen to be relevant in this study, are presented below.

Apfel and Herbes (2021) conclude that *knowledge* and *communication channels* are two constructs that need to be accounted for. They state that there needs to exist knowledge of the technology itself and to generate knowledge, communication channels play a decisive role. Gharaibeh et al. (2018) also includes *communication channels*, i.e. mass media, for similar reasons as Apfel and Herbes (2021).

Gharaibeh et al. (2018) and Manrai et al., 2021 are further considering *trust* as an important construct, where high levels of trust in the banking system and the security of mobile banking services are essential. Furthermore, the authors state that users need to trust the security and reliability of the technology and the institutions behind it to adopt mobile banking services. In the studies, trust was highly connected to trust in financial services, and there were no findings of trust as a construct in any other context.

Furthermore, Dutta and Shivani (2020) chose to include *individual innovativeness*, which is about the individual openness to trying and experiencing new things, as an additional construct that could further drive women's intention to adopt new technologies.

Overall, the reviewed studies show that *performance expectancy* and *facilitating conditions* are the most critical factors influencing the adoption of new technologies in a developing context. Performance expectancy consistently shows a strong positive effect, driven by the belief in increased efficiency, productivity, and cost reductions. Facilitating conditions, including infrastructure, resources, knowledge, and support systems, are widely recognized as crucial for effective technology adoption. *Effort expectancy* and *social influence* also play an important role, especially for women, with the ease of use and support from friends, family, and community as important factors. Conversely, *hedonic motivation* and *habit* have generally been found to have low influence. *Price value* has mixed importance, being important in some contexts and less important in others. From the other constructs found, knowledge trust, and communication channels, play an important role in technology adoption in developing contexts.

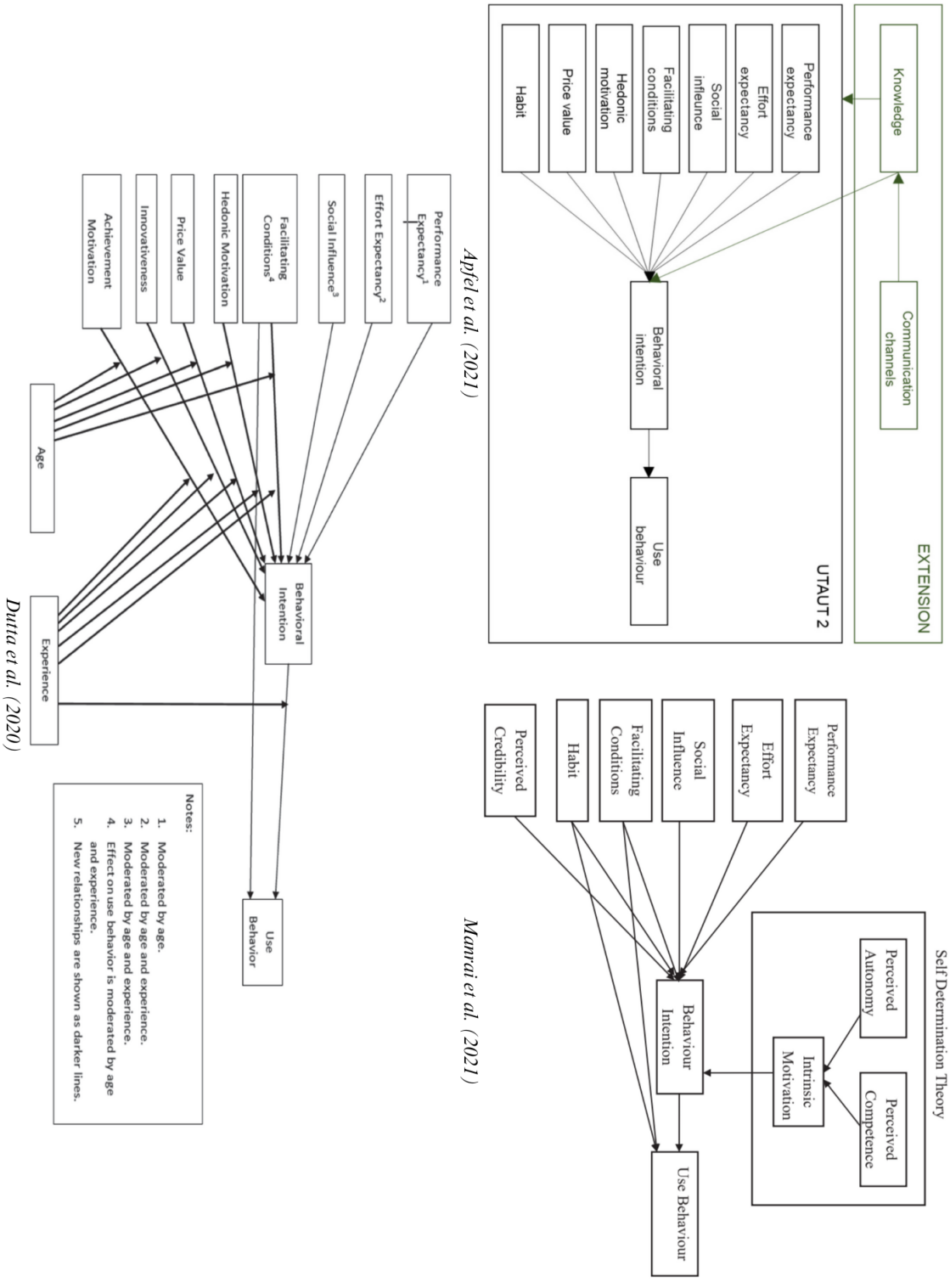

Figure 2.3: Examples of extensions of the UTAUT2 framework done by Apfel and Herbes (2021) to the top right, Manrai et al. (2021) to the bottom right, and Dutta and Shivani (2020) to the left.

2.3 Gender disparities and women's empowerment

Inequalities based on gender can be seen in several contexts. Moreover, as argued by Duflo (2012), inequalities are often larger in developing countries. Women in these regions are often subject to several systematic differences throughout their life cycle, from the prenatal stage to adulthood and into later years Duflo, 2012. These disparities manifest themselves in unequal access to education, jobs, and political engagement, resulting in a persistent backlog compared to men.

These gender disparities are particularly prominent in Sub-Saharan Africa, often stemming from cultural norms that favor males (Abdi, 2019). This bias toward favoring males perpetuates a vicious cycle wherein women are afforded lower priority in life for things such as education, healthcare, and employment opportunities. Consequently, women have fewer prerequisites to contribute financially to their households and their aspirations and expectations in life are often lower (Duflo, 2012). The fact that it is more difficult for women to contribute, further reinforces unequal treatment and expectations, with men receiving even greater prioritization and increased investment in their education and healthcare.

This is further accompanied by a hard-to-change, long-standing gendered social construction, pervasive both in developing and developed countries, where women assume a greater share of household responsibilities compared to men (Duflo, 2012). This division of labor limits women's ability to seek formal employment, leading them to choose often lower-paid informal work, which they can coordinate with their household and childcare responsibilities.

The effects of this prioritization are not only affecting the women's future and opportunities. Abdi (2019) argues that this also has significant economic implications, resulting in decreased productivity and a hindering of global economic growth. Notably, countries lose an estimated $160 trillion in wealth due to gender disparities in lifetime earnings. Consequently, women's access to equal opportunities compared to men is adversely affected by various social factors, with repercussions felt both at the individual level and as costs to society. Hence, both nations and individual women would benefit from a more equal society.

2.3.1 The relation between empowering women and development

A way to make women more included in society would be to increase awareness about the subject, and emphasize what prioritizing women could lead to. Therefore, the below text highlights the effects seen in society from earlier attempts to target women and women's empowerment.

- **Better outcomes from increased labor market opportunities**:
  In his article, Duflo (2012) brings up three recent studies, one in China and two in India, all showing that increased opportunities for women in the la-

bor market translate into better outcomes for women overall. In rural China, this was done by boosting a specific production of tea where women had a comparative advantage due to physical attributes. As a result, the females' income increased which later translated into increased survival rates for females. Another experiment mentioned in the article, conducted by Jensen in 2010, focused on gender-specific recruitment strategies for Business Process Outsourcing (BPO) centers in rural regions of India, known for gender discrimination. In areas where specific targeted efforts were made to recruit women, either exclusively or alongside men, a higher number of women got employed. In the years that followed after these efforts, girls aged five to eleven exhibited higher rates of school enrollment. Moreover, observable indicators suggested that girls were also prioritized to a larger extent in the families. Hence, both the experiments in China and India indicate that giving opportunities to women has the potential to reduce inequalities by affecting the view of a woman's role and value in society.

- **Enhanced household bargaining power trough income earning**:
  As underscored by World Bank (2012), a woman's ability to earn income constitutes a central mechanism for bolstering her bargaining power within the household and her ability to obtain different types of resources. Consequently, this holds significant implications for a woman's ability to dissolve a marriage, navigate through crises, and invest in and broaden her earnings and economic prospects. Furthermore, it is found that there is a correlation between increasing women's wages and declining domestic violence in the long run (World Bank, 2012).

- **New connections from work opportunities**:
  World Bank (2012) highlights that giving women similar opportunities to work also enables them to broaden their social networks and increase the exchange of information and support. Consequently, this is argued to be a crucial element in societal transformation, as women, when united, have demonstrated the ability to apply greater pressure and advocate for structural reforms that improve conditions for other women. Through collective action, women can drive changes in legislation, policies, services, institutions, and cultural, as well as, social norms, ultimately bolstering women's capacity to set and pursue their goals (World Bank, 2012; Bloom et al., 2017).

- **Link between empowering women and increased development**:
  As argued by Abdi (2019), empowering women is not only a way to reintroduce them to society and their rights, but society can also benefit from a gender distribution of the nation's money. Thus, as also mentioned by Duflo (2012), there is a link between empowering women and increased development. Women's World Banking (2023), which works to empower women through financial inclusion emphasizes that the reason for empowering women will increase development is the fact that women's spending behavior differs significantly from that of men, reflecting different priorities and values. More specifically, women

tend to allocate their financial resources with a strong focus on the well-being of their families and the community, directing a significant portion of their income towards basic needs such as education, healthcare, and housing. On average, women spend 90 cents of every dollar earned in these critical areas, as opposed to men's 60 cents (Women's World Banking, 2023). This difference in spending behavior is also supported by the global organization International Monetary Fund (IMF, 2024), who argue that giving women money tends to result in more people, especially children and communities, being positively affected. By giving women greater access to financial resources, it provides far-reaching benefits that extend beyond individual households. It triggers a multiplier effect that reinforces the impact of financial inclusion on poverty reduction and economic growth.

- **Increased health and productivity from enhanced mobility**:
  Furthermore, Enhancing mobility for women can significantly improve their economic participation by reducing the physical burden and increasing their access to markets (Porter, 2002). Reducing the physical burden on women, such as through improved water access, has been shown to enhance reproductive health and overall productivity. Porter (2002) further states that when the energy expenditure on tasks like water collection is reduced, women's nutritional levels and birth outcomes improve.

To conclude, it is essential to recognize that increased development alone does not necessarily translate to heightened equality. Economic and mobility advancement can enhance factors like incomes, access to services, and infrastructural expansion, thereby potentially augmenting opportunities for women to define and pursue their goals. However, economic growth in isolation does not necessarily eliminate gender disparities. There needs to be an awareness of how gender is affected by different decisions or actions. One way to address this is by increasing women's earnings, and mobility and providing them with employment. However, this is not only a way to give women and men equal economic opportunities and survival rates. It can also serve as a starting point for mobilization, increased knowledge, and a fight for women's rights in societies where men are often prioritized. A summary of the key points presented by the different authors is shown in Table 2.2.

Authors	Key points
Duflo (2012)	• Gender inequalities are more pronounced in developing countries, affecting women from prenatal stages to later years. • Women have fewer opportunities to contribute financially, reinforcing gender disparities. • Long-standing gender roles limit women's formal employment options. • Increasing awareness and opportunities for women can improve societal outcomes. • Case studies in China and India show that targeted employment opportunities for women lead to better educational and economic outcomes. • Empowering women is linked to increased development.
Abdi (2019)	• Gender disparities are especially prominent in Sub-Saharan Africa due to cultural norms favoring males. • These disparities have significant economic implications, reducing productivity and hindering global economic growth. • Gender disparities in lifetime earnings cost countries an estimated $160 trillion. • Empowering women benefits both society and individual women by reintroducing them to their rights and economic opportunities.
World Bank (2024)	• Women's ability to earn income enhances their household bargaining power and access to resources. • Increasing women's wages is linked to reduced domestic violence. • Similar work opportunities for women enable them to expand their social networks and support systems. • Collective action by women can drive legislative and policy changes, improving conditions for all women.
Bloom et al. (2017)	• Women's collective action can lead to significant societal transformations, such as changes in legislation, policies, and social norms.
Women's World Banking (2023)	• Women prioritize family and community well-being in their spending, focusing on education, healthcare, and housing. • Women spend 90 cents of every dollar earned on these critical areas, compared to men's 60 cents.
IMF (2024)	• Giving women greater access to financial resources benefits more people, especially children and communities. • This financial inclusion triggers a multiplier effect, reinforcing poverty reduction and economic growth.
Porter (2002)	• Giving women mobility increases their economic participation and access to markets. • By decreasing the physical burden of carrying stuff over long distances on foot, the health of the women increases.

Table 2.2: Summary of key points about gender inequalities and empowerment from the different authors mentioned.

3
Methodology

This chapter outlines the research's design and strategy applied to address the overarching aim and research questions of this study. Firstly, an overview of the research design and strategy will be provided, offering a concise introduction to the various components of the research and the utilization of the theoretical framework UTAUT2. Subsequently, a comprehensive explanation of the data collection and analysis procedures will be presented to elucidate the specific decisions and actions taken throughout the research process. After that, an explanation of the study's context will be presented. Finally, a discussion on quality criteria and ethical considerations will be provided.

3.1 Research design and strategy

This research has followed a constructionist and an interpretive approach, which means knowledge has been found through qualitative and abductive methods (Bell et al., 2019, p.24). This was done by building on conceptual frameworks derived from patterns, themes, and relationships emerging during the study, rather than beginning with a fully formed preconceived hypothesis or theory. The reason for this approach was the anticipation that much would become evident over time, necessitating a willingness to adapt questions and objectives based on the information discovered. The UTAUT2 framework was used to structure and guide the research and data collection as discussed in the Theoretical background. However, as discussed in the Theoretical background, the UTAUT2 framework is not developed for use in a developing context, and little emphasis has been put on women, especially in rural regions. Therefore, this research used the UTAUT2 framework as a base, and the collected data was used to complement the existing framework by enabling new theories and insights about technology acceptance among rural women in a developing context. By doing so, this research has further contributed to filling the gap in the literature about the technology acceptance of rural women in a development context.

To be able to investigate technology acceptance from an already existing technology and technology provider, the research was conducted through a case study with the local Zimbabwean company Mobility for Africa. The choice of a case study was driven by the need for an in-depth exploration of how technology has been deployed within this context, which the case study approach could facilitate (Bell et al., 2019, p.64). Bell et al. (2019, p.63) argues that a case study allows for

the utilization of multiple qualitative methods, mitigating reliance on a singular approach and addressing potential challenges in obtaining valid data that would hinder a comprehensive understanding. Consequently, rich and detailed data could be collected, enabling a thorough exploration of the factors influencing rural women's incentives to adopt electric tricycles based on MFA's operations.

Moreover, this study concentrated on female participants, rendering it a significant component of feminist research (Bell et al., 2019, p.419). The data collected contributed to documenting women's lives and activities. Through observation and interviews with women in rural Zimbabwe, the research sought to gain insight from their perspective. However, while the emphasis was on women, men were also observed, interviewed, and included in focus groups. This approach aimed to deepen understanding of the complex context and discern factors that might hold particular significance for women compared to men.

3.2 Field study as data collection

To fully understand the perspectives of the women and the culture and the geographical landscape surrounding them, a two-month field study was conducted with a focus on rural areas of Zimbabwe. Given the scarcity of information regarding the rural context studied, along with the intersection of mobility, technology acceptance, women, and developing countries, the primary objective of the field study was to collect novel data that could complement existing literature and enhance the understanding of the factors influencing the adoption and usage of the electric tricycles in rural Zimbabwe. Furthermore, being physically present in the field facilitated a more nuanced exploration of the complexities inherent in the research domain, thereby contributing to a more accurate and comprehensive analysis.

The field study consisted of three qualitative research methods: observations, interviews, and focus groups. All these were executed at different times, days, and in different rural areas, to minimize the risk of drawing conclusions that are only true for one area, or one specific day, and so on (Bell et al., 2019, p.357,400). This multifaceted approach aimed to generate an in-depth understanding of rural women and their surroundings and how MFA had contributed to the deployment of e-mobility among women in rural Zimbabwe.

3.2.1 Participant selection and sampling

The sampling frame was limited to individuals directly or indirectly connected to the five different locations in rural Zimbabwe where MFA was operating or planning to operate. Including all these rural areas aimed to ensure a comprehensive understanding of the dynamics of adoption, usage, and its effects. Each site was chosen for its unique environmental and social characteristics, known to influence the adoption of new technologies and services. Additionally, the Hamba had been implemented in these societies for varying periods, further contributing to the uniqueness of each area. By covering a range of settings, from diverse geographical landscapes

to different socio-economic contexts, the study aimed to capture a wide array of experiences and challenges. This approach was expected to enhance the applicability of the study's findings to other rural developing contexts. By examining adoption and usage patterns in different rural areas, the study sought to identify common denominators and trends that transcend specific local contexts.

From the accessible population, participants were selected using a purposive sampling approach, which involves strategic selection based on predetermined criteria ((Bell et al., 2019, p.391). While this method may limit the applicability of findings to the broader population, it serves to deepen the understanding of the specific context and research question (Bell et al., 2019, p.389). Furthermore, employees from MFA, familiar with the local area and its rural inhabitants, helped identify individuals who fulfilled the specific criteria.

Some participant selection was determined beforehand, indicating a partially fixed sampling approach (Bell et al., 2019, p.391). Nevertheless, there remained flexibility in participant selection, with new individuals added spontaneously if they crossed paths with the research team. Further, more individuals were added as insights unfolded during the data collection. In the end, the selected participants included current users of the Hamba, applicants awaiting usage, non-applicants, and individuals expressing disinterest in the Hamba. The participants of the study and how they relate to the sampling frame and larger population are shown in Figure 3.1 below.

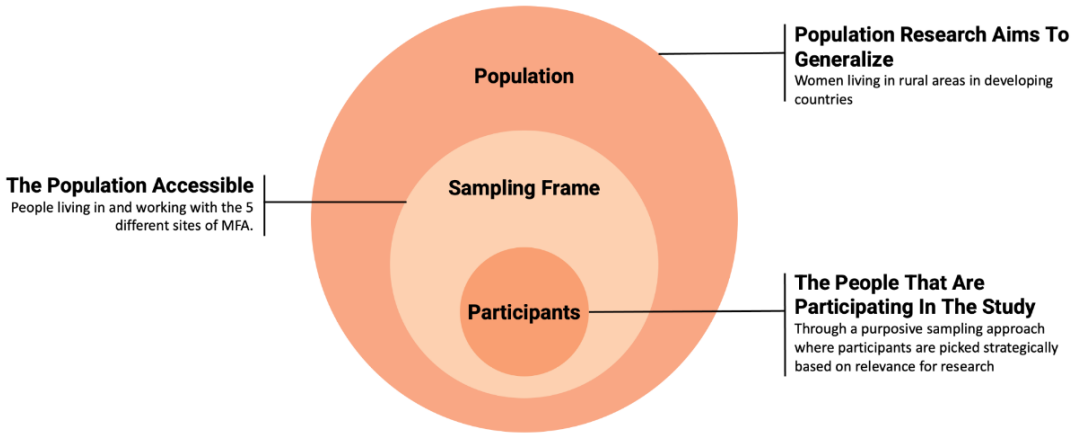

Figure 3.1: A breakdown of the population, sampling frame, and participants of the study.

3.2.2 Field notes and observations

Observations were conducted to complement the insights gained from interviews and focus groups, providing a deeper understanding of the surrounding social context (Bell et al., 2019, p.410). While these observations were integrated throughout the entire field study, spanning from MFA's headquarters in Harare to the six different

visits to the five rural areas, specific attention was devoted to the latter.

The observations were distinguished by an active approach, meaning that an active role in the environment being studied was taken and that the researchers engaged in activities and interacted with participants (Bell et al., 2019, p.414). By conducting active observations the establishment of a robust relationship between the researchers and the individuals being observed was facilitated. This is in turn believed to have influenced participants' involvement in the activities and contributed to a more open environment where firsthand insights could be gained into different dynamics within the studied context.

The six site visits that were made are shown in Table 3.1 together with the period of the observation.

Site-visit	Site	Date
1	Domboshava	1st of March 2024
2	Wedza	7th until 8th of March 2024
3	Watsomba	18th to 19th and 22nd of March
4	Honde Valley	21st of March
5	Domboshava	3rd of April
6	Chipinge	8th until 12th of April

Table 3.1: The different site visits and site observations conducted.

During these site visits the opportunity to immerse in the everyday realities of the communities was provided, gaining invaluable insights beyond what could be captured through interviews or focus groups alone.

To ensure that observations were remembered, notes were taken during the site visits, and audio tapes including reflections and descriptions were recorded. As emphasized by Bell et al. (2019, p.416), notes and reflections were conducted close in time to the observation and included vivid and clear details regarding location, time, and persons involved to reduce the risk of misinterpretation.

3.2.3 Interviews and focus groups

The primary component of the method involved conducting interviews and focus group discussions with users and potential adopters of the Hamba. This was done at different rural sites to be able to conclude results broader than from one specific rural area. During the field study questions and longer formal and informal talks were consistently conducted with employees at MFA to gain a deeper understanding of the company, and the context of the study and to verify factual information.

3.2.3.1 Focus Groups

As part of the interviews with rural women, focus groups were conducted. The focus groups followed the approach outlined by Bell et al. (p.463), which means that the focus groups were moderated group discussions centered around open-ended questions about the participants' perceptions and experiences with the Hamba. By doing this, insights were gathered from multiple participants simultaneously, and novel perspectives emerged through collaborative discussion. Additionally, the use of focus groups provided a supportive environment for the participating women, fostering confidence to express their opinions among peers (Bell et al., 2019, p.456). Figure 3.2 shows a picture of what the focus groups could look like.

Figure 3.2: Focus group in Wedza

The questions asked during the focus groups were initially formulated in advance, through three different interview guides described below, and were further refined during the conduct of the focus groups. This iterative process ensured that the questions were formulated in a way that was both understandable and conducive to obtaining valuable responses. All questions originated from the three predefined interview guides A, B, and C, found in the Appendix. The interview guides were created for people using the Hamba (denoted A), for people who had accepted, but did not have the Hamba yet (denoted B), and one for people who did not accept the Hamba (denoted C). This division in the interview guide was possible since the focus groups and interviews always were sampled using the same criteria. In the interview guides, the questions were categorized based on their relevance to three key aspects: adoption of technology, usage of technology, and opportunities associated with the technology. This categorization was carried out to align with the UTAUT2 framework, ensuring comprehensive coverage of factors influencing both the adoption and usage. Moreover, the category about opportunities also aimed to explore potential impacts stemming from the implementation of the Hamba.

To be able to generalize we conducted results, at least one focus group was held at every site. This as the sites have different characteristics when it comes to what the area looks like, how long the Hamba has been there, and what genders have been given the Hamba. The different focus groups conducted can be seen in Table 3.2,

together with their given ID, which interview guide was used, the date and time for the focus group, and number of participants and characteristics of the participants.

Site	ID	Guide	Date	Time	Participants	Characteristics
Wedza	F1	A	8th of March	45 min	8	Women who had used the Hamba for between 3 to 5 years
Watsomba	F2	A	20th of March	1 hour	7	Women who had used the Hamba for 2 weeks. All for transport and logistics
Honde Valley	F3	B	21st of March	35 min	36	Women interested in acquiring the Hamba. However, none of them had yet utilized the vehicle
Domboshava	F4	A	3rd of April	1 hour	11	Women who had used the Hamba for between 3 months to two years
Chipinge	F5	A	9th of April	50 min	15	Women who used the Hamba for transport and logistics
Chipinge	F6	A	12th of April	50 min	8	Men who had used the Hamba for transport and logistics

Table 3.2: A summary of information and characteristics about the focus groups conducted.

3.2.3.2 Interviews

The interviews were mainly conducted to supplement the information from the focus groups. Therefore, a few interviews were conducted with individuals who either held higher positions in the community or had different opinions from those found in the focus groups. The focus was on the participants' points of view, encouraging exploration to gain insights into what the participants found relevant. As the research followed a qualitative method, the interviews were characterized by a semi-structured format (Bell et al., 2019, p.435). This approach ensured that all necessary topics were covered without missing anything due to predetermined questions. Hence, the predefined questions were only used as a guide, complemented with follow-up and specifying questions.

In total six interviews were conducted with different individuals. In these interviews, one of the three predefined interview guides was used. Which interview guide that was used was therefore determined by which of the three above categories the person belonged to. Table 3.3 shows the six different interviews, a description of the interviewee, the date, length, and the specific ID given to the interview. The ID is used in the text that follows when information from the interview is presented.

Interviewee	ID	Guide	Date	Time	Interview type
Woman in Watsomba interested in buying a Hamba	W1	B	20th of March	5 min	Semi-Structured interview
Woman in Domboshava not wanting to apply for the Hamba	W2	C	3rd of April	20 min	Semi-Structured interview
Woman in Chipinge not wanting to apply for the Hamba	W3	C	9th of April	15 min	Semi-Structured interview
Woman in Chipinge that just applied for the Hamba	W4	B	9th of April	5 min	Semi-Structured interview
Community leader in Chipinge	L1	B	9th of April	15 min	Semi-Structured interview
Man with higher responsibility at Chipinge operating a Hamba	L2	A	10th of April	30 min	Semi-Structured interview

Table 3.3: A summary of the interviews conducted with different individuals in the communities.

3.3 The context of the field study

This section provides a detailed description of the context of the field study. First, an introduction to the company collaborating on this report will be provided, namely Mobility for Africa, in combination with some background information about the country, Zimbabwe, Subsequently, the various sites where data were collected, and where the company operates, will be described. This description aims to enhance understanding of the contextual characteristics, as they may influence the study's outcomes.

3.3.1 Description of Mobility for Africa and Zimbabwe

Mobility For Africa was founded in 2018, by Shantha Bloemen, to transform and improve rural communities' living standards through mobility. The company was founded in the lower middle-income country Zimbabwe, situated in Sub-Saharan Africa, bordering South Africa, Botswana, Zambia, and Mozambique, shown in Figure 3.3. In 2023, the country had a population of 16,6 million people (Worldometer, 2024). Today around 68 percent of the population lives in rural areas, where agriculture is the main source of income, primarily through small-scale farming (The World Bank, n.d.;Ministry of Foreign Affairs & International Trade, n.d.; Mwenye and Bloemen, 2023).

Figure 3.3: Zimbabwe's geographical placement in Africa.

At a national level, agriculture employs approximately 70 percent of Zimbabwe's population (Ministry of Foreign Affairs & International Trade, n.d.;The Food and Agriculture Organization, n.d.) and accounts for about 45 percent of the country's exports (Ministry of Foreign Affairs & International Trade, n.d.). The agricultural work is usually done by smallholder farmers, who encounter multifaceted challenges like limited transport options, outdated farming techniques, and scarce resources which culminate in low productivity levels and returns (Mwenye and Bloemen, 2023).

In addition to this, a large part of the population needs to travel long distances daily. According to a study conducted by Zimbabwe Vulnerability Assessment Committee (2023), 27 percent of the households have more than 5km to the nearest primary school and as much as 47 percent of the households have more than 5km to the nearest health facility. In combination with these longer distances, bad roads are making transportation even harder. According to Zikhali (2017), The Independent wrote in an article from 2017 "Zimbabwean roads have outlived their lifespan, which is normally 20 years and are now over 60 years old and they are not getting the necessary maintenance". The situation has risen to a level where it has become a threat to the country's economy, as the roads are considered the focal point of the country's trade with its main trading partners and neighbors South Africa and Zambia (Zikhali, 2017).

The poor status of the roads has not just impacted Zimbabwe's exports but also led to some areas becoming inaccessible and farmers being overcharged for the transport of their goods (Situation, 2022). Buses are no longer running certain routes, preventing the population in some areas from accessing the markets by any means other than on foot. Chibaro et al. (2022) further emphasizes this, by concluding that the poor roads of rural Zimbabwe and the limited vehicle utilization are the main reasons for the extremely high transportation costs over small distances, further limiting the mobility of the people.

MFA's strategic approach to accomplishing this mobility issue involves disseminating solar-powered, swappable, batteries together with complementing electric tricycles within communities, where the focus is mainly on women who work as small-scale farmers, traders or similar in rural and peri-urban areas of Zimbabwe. The e-tricycles, shown in Figure 3.4, are known as "Hamba" meaning "go ahead" in the local Ndebele language.

Figure 3.4: The electric tricycle, the Hamba, being used by a woman who transports people (Mobility for Africa, 2021).

The company had its first operational pilot in Wedza 2019. Since then, MFA has undergone five years of ambitious R&D combined with adjusting different parts of the business model based on lessons learned from tests and pilot projects in different rural areas around Zimbabwe. As a result, the company is confident about leaving the testing phase and has been undergoing scaling since the end of 2023.

Presently, the MFA manages a fleet of over 250 Hamba units, catering to a diverse customer base exceeding 360 individuals, who are operating Hamba tricycles in four different rural areas across Zimbabwe, namely: Domboshava, Wedza, Chipinge, and Watsomba. The headquarters and manufacturing facility are located in Harare.

3.3.1.1 The customers of Mobility for Africa

The main target customers of MFA are smallholder farmers, traders, or similar, in rural areas that require transportation services for both first and last-mile logistics. Although the customers are both men and women, the company's main focus is on low-income women entrepreneurs.

Each morning, the Hamba customers plan their schedules, incorporating tasks such as household chores, agricultural work, and transporting people and goods. Some customers focus solely on transport and logistics, while others use the Hamba in farming and agriculture. The customers also strategically advertise their services to businesses, schools, and fellow farmers, negotiating contracts for tasks like carrying

feed, transporting produce, and taking children to school. Furthermore, the Hamba sometimes serves as a mobile shop, transporting goods for sale. For example, one woman uses the Hamba to drive around her town and sell Ice cream while another uses it to sell her homemade textiles.

3.3.1.2 Mobility for Africa's hardware and support infrastructure

For MFA, the Hamba is only an initial part of the offer. Besides the Hamba, the purchase includes a helmet, a charged replaceable lithium-ion battery, free assistance for battery swapping, and technical support from local technicians.

As charging infrastructure for electric vehicles barely exists in Zimbabwe, MFA has to set up the infrastructure required in the rural areas where they want to operate. Therefore, MFA has established solar-powered mini-grid stations in each rural area where they operate. These solar-powered mini-grid are known as MFA charging stations, and it is the place where batteries are charged, stored, and swapped. Each charging station can maintain up to around 50 Hamba vehicles. The stations are strategically located, often repurposing existing buildings near site locations or utilizing purpose-built shipping containers. When Hamba customers reside in more remote locations, extending beyond the proximity of the charging station, dedicated battery swapping points (BSP) have been established. These operational hubs facilitate the distribution of charged batteries. Customers needing a new battery at a BSP coordinate this through communication channels like WhatsApp. Consequently, when a customer's Hamba runs out of battery after traveling around 80-100 km, they visit the designated charging station or a BSP to receive a new battery.

Each of the MFA charging stations is operated by a minimum of three dedicated personnel, consisting of one coordinator and two technicians, also responsible for the BSP in the area. Before the employees get allocated to the MFA charging station, they undergo extensive training in maintenance, repairs, and battery-swapping procedures. It is also through site coordinators and technicians that aftermarket services, such as repairs and assistance, are offered. Besides this, site coordinators and technicians provide ongoing guidance and support to customers, offering valuable insights on maximizing the utility of the Hamba for their specific needs.

To reduce the need for maintenance and to ensure the highest standards of operation, all customers need to undergo a 10-day Hamba operator course which has been created in collaboration with the Traffic Safety Council of Zimbabwe. The course includes an oral theory and a practical driving test where road awareness, safety awareness, information about how to operate the Hamba, and information about the battery are tested. Furthermore, the company monitors customer performance to ensure they meet targets, such as weekly mileage requirements. In total, MFA aims for each customer to travel 400 km per week, which is equivalent to 4-5 battery swaps a week.

3.3.1.3 The development of the business model and the current lease-to-purchase revenue model

During the first five years of operations, MFA adapted the business model accordingly by testing several rental schemes in different pilot projects. For example, an independent contractor model was tested, where the Hamba was still fully owned by MFA, and the Hamba drivers instead worked with a 30 percent commission on everything they earned when using the Hamba. Currently, a lease-to-purchase model has been implemented based on insights gained during the R&D phase. Customers demonstrated a strong interest in owning the Hamba, viewing asset ownership as a form of personal development. This feedback supported the adoption of the lease-to-purchase approach.

The lease-to-purchase contract presently used implies that when a new customer is acquired, they pay off the Hamba over 12 months through a weekly fee. In addition to the payments for the Hamba, the customers pay for mandatory weekly battery swapping, which continues after the Hamba has been fully paid, and sales of spare parts. Hence, the main revenue stream and focus of the company is battery swapping, illustrated in Figure 3.5. Customers are also given the flexibility to designate three weeks per year for non-usage, thereby exempting them from battery swapping fees.

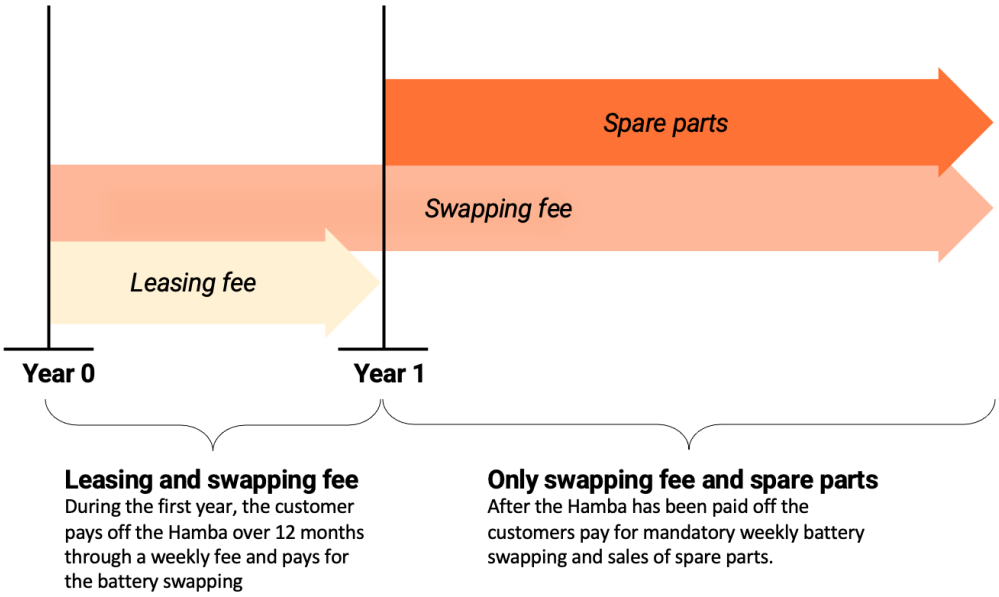

Figure 3.5: The three main revenue streams of MFA and when they receive them from a new customer.

Even if MFA still promotes using the Hamba work income-generating activities like transport as a service, the lease-to-purchase model opens new doors for the Hamba drivers. Having the Hamba as their asset creates new flexibility where they can

dedicate themselves to work when suitable, use the Hamba for private consumption, and contribute to the community by driving sick people to the hospital and school children to school.

3.3.1.4 The scaling process and customer acquisition

To address the target customers MFA has a unique scaling strategy that builds on finding potential regions or areas in Zimbabwe where a demand for the Hamba exists. When picked, these regions or areas will act as operational sites for MFA.

As part of the business model, MFA employs a customer acquisition process including a selection process to choose participants, hence their customers, at the different rural sites. Ultimately, the selection process serves as a foundational step in building a robust and trustworthy customer base and fostering long-term engagement within rural communities. In an interview with two employees of Mobility For Africa, the employees mentioned that this selection process aims to ensure that participants are committed and capable of utilizing the vehicles effectively. The company wants customers who will maximize the use of the Hamba, hence swapping many batteries.

The selection process for recruiting customers at the sites is described as involving a multifaceted approach aimed at engaging local communities and fostering confidence in the project. More specifically, the customer acquisition process consists of six sequential steps, which are shown in Figure 3.6.

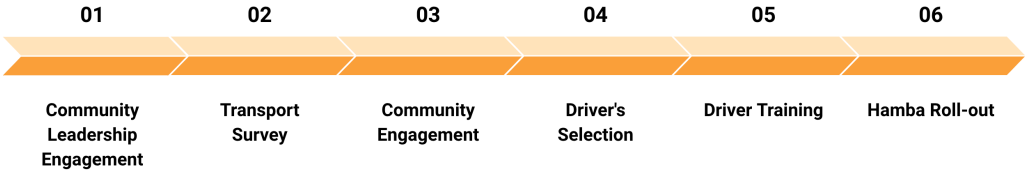

Figure 3.6: The six steps of the customer acquisition process.

When a new site is decided for operational roll-out, the acquisition starts with a community leadership engagement, where a meeting is set up with the local authority and community leaders such as headmen and the women's affairs department, to raise awareness and to get approval to operate in the specific community.

The second step involves a transport survey where the aim is to identify the key infrastructure. This is made by providing individuals in the area with a questionnaire that aims to understand the economic activities, value chains, and current transport and mobility needs in the area. After the transport survey, MFA aims for a community engagement where the leaders assist in gathering interested individuals within the community. Once gathered, MFA travels to the specific site and MFA staff personally introduces the Hamba to interested individuals. By utilizing tools

such as ODK (Open Data Kit), individuals can apply for the Hamba by submitting their information.

Following the submission of applications, the project team conducts interviews with prospective applicants to gain deeper insights into their requirements and motivations for utilizing the Hamba. Selection criteria, including household size, ambition, and work ethic, are utilized to identify suitable candidates, who are then invited to participate in the Hamba Operator Course, marking the fifth stage of the process. Notably, MFA staff acknowledges that the demand for the Hamba is high and that most of the customers who apply qualify.

Subsequently, the Hamba vehicles are deployed, and customers commence a 3-month trial period to assess their ability to afford the lease-to-purchase arrangement. This approach aims to prevent customers from acquiring the Hamba and subsequently struggling to meet payment obligations using alternative income sources. During the trial period, customers are expected to achieve specified targets, contributing to their learning curve and enhancing profitability as they gain familiarity with Hamba operations and business opportunities. After the 3 months, or earlier if the individual demonstrates strong profitability, customers transition to the lease-to-purchase model.

3.3.1.5 Mobility for Africa's goals and ambitions

Intending to have at least 70 percent of the customer base being females, MFA remains dedicated to empowering women and fostering economic development within rural communities through sustainable e-mobility solutions. Today, they are above that goal, with 75 percent of the customers being females. Furthermore, MFA has the mission of fostering a positive influence on the rural African economy by introducing electric vehicles to ordinary individuals, with a specific emphasis on women and individuals residing in rural areas. The organization envisions a future in Africa where each rural household has reliable, cost-effective, environmentally friendly, and purpose-designed transportation, thereby elevating incomes and improving the overall quality of life. Therefore, the company's long-term goal is to export to countries like Zambia, Mozambique, Namibia, and other nations in Africa.

3.3.2 Description of the visited Sites

As mentioned in the chapter above, a new operational site is established when the MFA expands its activities. Each site includes a charging station, local staff, designated Hamba vehicles, and batteries. Currently, MFA has five operational sites, namely Domboshava, Wedza, Watsomba, Chipinge, and Honde Valley which were all visited to understand their unique context. Wort noting is that Honde Valley was visited before the extension to the area was finalized, hence the area still lacked Hamba vehicles during the visit. The geographical placement of all visited sites is shown in Figure 3.7.

Figure 3.7: Geographical location of Mobility for Africa's current operational sites, including the capital Harare, where the headquarters are located.

This section will provide an in-depth description of the distinct attributes of the sites, and detail the ongoing operations within these areas. At the end of this section, Table 3.4 presents a concise summary and comparison of the information presented about the sites in the sections below, which highlights key takeaway characteristics of the different sites.

3.3.2.1 Domboshava

Domboshava is a peri-urban residential area 20km from Harare. In the area, it is estimated that approximately 225,000 people live, where most of whom are considered to be either smallholder farmers or traders. The most common transportation for both people and goods is the Mushikshika, but there also exist normal bus routes from Harare and Combis. Other vehicles that only transport goods are pushed carts.

For most farmers in the area, the access point for transport services like Mushikashikas is approximately 5km from their homes, meaning that many need to carry their goods by foot from the access point to their homes and back. As the farmers further reported struggles with carrying their produce to the market due to high transport costs, irregularity of vehicles, and insufficient means of transportation, MFA launched its operations at the site in 2021. Initially, the introduction of the Hamba vehicles in Domboshava was made through a local partnership with an NGO, where poultry farmers were targeted. These farmers got the Hamba 100 percent subsidized. In total 20 Hambas were prepaid. Today the area also encompasses other

customers that are on the lease-to-purchasing model. In general, the Hamba serves as a vital transportation asset for ferrying produce, particularly eggs, to centralized collection points, cargo for construction, and for transporting people.

Compared to the other sites, gender norms are less patriarchal, allowing women to be a part of the work labor in various sectors, including transportation. Today the area is facilitating the deployment of approximately 45 Hambas, which are operated 50/50 by both men and women.The described characteristics of Wedza are summarized in Figure 3.8.

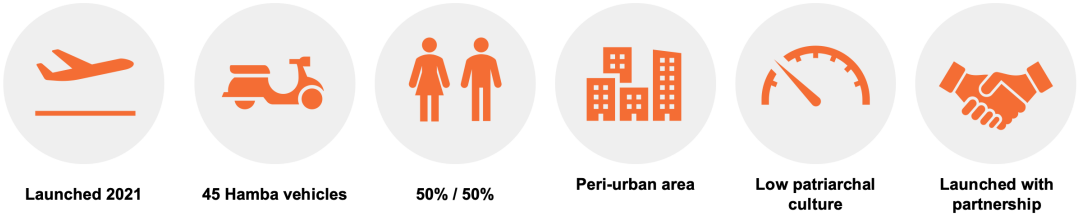

Figure 3.8: Characteristics of Domboshava.

3.3.2.2 Wedza

Wedza is a district situated around 120km South of Harare. It has a population of around 75,000 and consists of many smallholder farmers. The area depends on agricultural products to generate income where the focus is on horticulture activities, with tobacco and ground nuts being the most dominant crops. The distances in Wedza are long and most of the roads are considered bad quality. Hence the farmers in the areas struggle to carry their farm produce to the nearest market. The most common means of transport for both people and goods is the Mushikashika. Other transport for goods are ox-drawn carts and pushed carts.

Wedza was the first site where MFA rolled out its operations. This was done in 2019, as a pilot project. Since then several renting models, Hamba models, and batteries have been tested to find the most suitable solution. Today, Wedza has approximately 60 Hamba vehicles, all operated by females. Wedza possesses a somehow patriarchal social structure but with a nuanced view of gender roles. While men show some openness to modern ideals, traditional norms persist and influence perceptions of women's participation in economic activities such as driving Hamba vehicles. The described characteristics of Wedza are summarized in Figure 3.9.

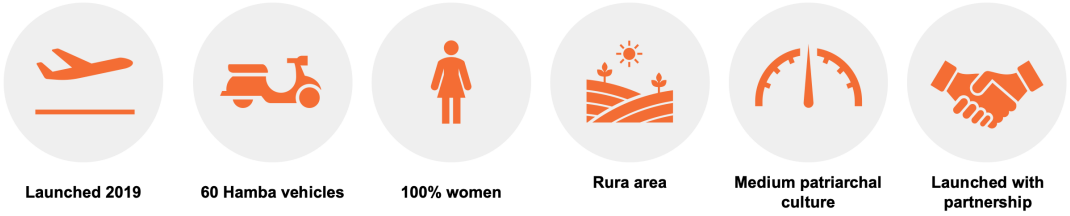

Figure 3.9: Characteristics of Wedza.

3.3.2.3 Watsomba

Watsomba, established in 2024, represents the latest addition to MFA's operational sites. The site is located approximately 190km southeast of Harare, close to the Mozambique border and the famous Nyanga mountains. Compared to the other sites, Watsomba is not a district or residential area, but a growth point that got its name from a local bar called "Watson Bar". As the area is well established for trading, it is a strategic location for Hamba drivers, which is why the MFA charging station is located there. In the area, donkey-drawn carts, ox-drawn carts, and pushed carts are used for transporting goods, but the most common transport for transporting both people and goods is the Mushikashika.

Watsomba's social structure reflects a balanced dynamic and a moderate level of conservatism. New settlements and a growing community of dairy farmers are also characterizing the area. Although field crops and horticulture thrive in the landscape, the dairy industry remains dominant. Watsomba's milk collection centers are known for producing high milk volumes and supplying the National Dairy Association with a significant portion of dairy products. Today, there are about 20 Hamba vehicles on site, with a gender distribution of 30 percent men and 70 percent women, and the demand for Hamba is still very high. The described characteristics of Watsomba are summarized in Figure 3.10.

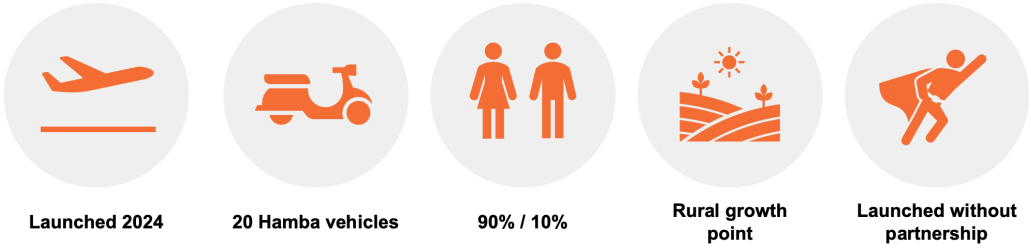

Figure 3.10: Characteristics of Watsomba.

3.3.2.4 Chipinge

Chipinge is located near the border to Mozambique and is currently the site that is situated furthest away from MFA headquarters. The district hosts approximately 375,000 people in the rural areas and around 35,000 people in the urban area of

Chipinge town, giving its placing rural to semi-rural characteristics. The district is famous for its high temperatures and rainfall, which favors the cultivation of avocados, bananas, tea, macadamia nuts, and dairy products. The most common means of transportation for both people and goods is, as on the other sites Mushikashika. However, motorbikes are also well established in the district, and for carrying produce it is also common to use donkey-drawn carts, ox-drawn carts, and pushed carts.

In Chipinge, MFA has established three different sub-sites: Mayfield, Goshen, and Dairibord. Mayfield, the first site established in 2022, accommodates about 25 Hamba vehicles. These vehicles serve dairy farmers and were introduced in collaboration with an NGO, which covered 70 percent of the costs, while the farmers themselves contributed the remaining 30 percent. Next, Dairibord was introduced in mid-2023. The station is located in Chipinge town, and strategically positioned next to the milk factory Dairibord Zimbabwe. The reason for the location is that MFA can help service small-scale dairy farmers around Chipinge. The last site to be established in Chipinge was Goshen, which was introduced within a month of the introduction of the Dairibord site. Presently, Dairibord has 50 operating Hamba drivers, and Goshen has 5, all operating in T&L.

In Chipinge, 40 percent of the Hamba drivers are men, while 60 percent are women. Of all the sites explained, Chipinge is the site with the most primitive culture. The culture is considered to be very conservative and highly patriarchal with little flexibility to change its cultural norms. The described characteristics of Chipinge are summarized in Figure 3.11.

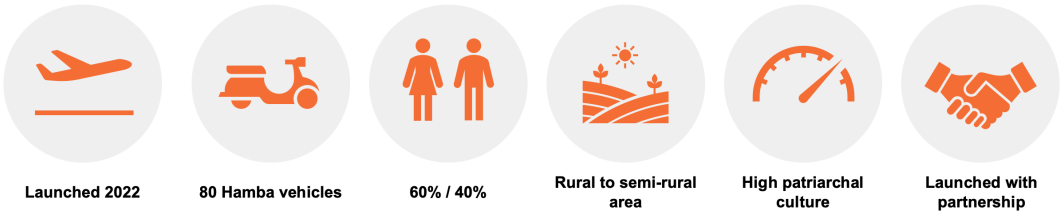

Figure 3.11: Characteristics of Chipinge.

3.3.2.5 Honde Valley

In May 2024, MFA extended its presence to additional regions, with Honde Valley. This extension was like Watsomba done without any partnership. However, similar to in Dairibord in Chipinge, the extension was done in close relation to the milk collection center. Honde Valley is situated in the eastern region of Zimbabwe close to Watsomba, approximately 300 kilometers from Harare, near the Mozambique border. Its placing is rural, but similar to Watsomba, it is considered to be a growth point. However, today it is so large that the area almost could be considered a residential area. Similar to the previously explained sites, Mushikashika mostly handles transportation, but transportation of goods is also handled by donkey-drawn

carts, ox-drawn carts, and pushed carts. The roll-out in Honde Valley consisted of 20 Hamba drivers, and 90 percent of the these were women. The described characteristics of Honde Valley are summarized in Figure 3.12.

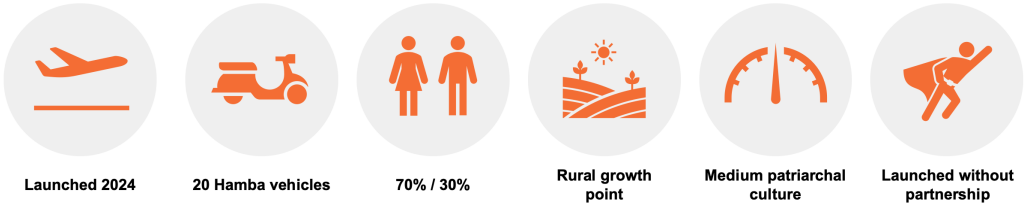

Figure 3.12: Characteristics of Honde Valley.

3.4 Data analysis

The data collected during the field study was continuously analyzed and labeled as adoption, usage, or effects in society. This was to ensure comprehensive coverage of all of the research questions. Subsequently, the collected data in all of the categories underwent a thematic analysis where first-order themes were identified, free from the influence of preconceived frameworks (Bell et al., 2019, p.519). These first-order themes were categorized under either influence on adoption, influence on usage, or effects in society.

From the first-order themes, new second-order themes were found. These themes are called factors in the report, and they were either identified as one of the UTAUT2 constructs or new additional factors. Each of these factors was further analyzed from how they had influenced the adoption in terms of different dimensions.

The gender and experience included in the UTAUT2 framework were already predetermined. Hence these moderators were not taken into account. Furthermore, the research did not take into consideration the age of the women. This implies that the specific age of the women was ignored and instead, the focus was on all women who are part of the working-age population, which is the population above 15 years old.

The last step in the analysis implied analyzing the strength of factors found to gain a deeper understanding of how they influence the adoption and usage. This was made for both the adoption and the usage. To facilitate this, three dimensions were used to categorize the strength: weak, medium, and strong. A weak influence implied that the factor was influencing but to a lower extent. A strong influence implied that the factor was influencing to a larger extent and was vital in the decision to adopt or for usage. However, the additional factors found were not analyzed based on their strength. The reason for this was that for them to be added to the framework, their influence had to be strong from the beginning.

This approach of collecting, analyzing, and mapping conducted to address the first research question is illustrated in Figure 3.13 below.

Site	Domboshava	Wedza	Chipinge	Watsomba	Hondey Valley
Year of Roll-out	2021	2019	*2022 Mayfield* *2023 Dairibord* *2023 Goshen*	2024	2024
Approx. nr. of Hambas	45	60	80 total *25 Mayfield* *25 Goshen* *50 Dairibord*	20	20
User Gender	50% Women 50% Men	100% Women	60% Women 40% Men	70% Women 30% Men	90% women 10% Men
Type of Area	Peri-Urban	Rural	*Dairibord Semi-rural* *Mayfield rural* *Goshen rural*	Rural growth point	Rural growth point
Social Character-istics	Softer culture with urban characteristics, fostering a balanced gender dynamic. Women's financial independence is more prevalent.	Patriarchal culture present, but with men more open to modern ideas and women's employment.	Strongly conservative with patriarchal norms	Balanced gender dynamics and less conservative	-
Transport Carrying	Mostly cargo of hardware and agricultural goods, but also passengers.	Mostly passengers, but also cargo of agricultural goods.	Balance between cargo of agricultural goods and passengers.	Balance between cargo of agricultural goods and passengers	-
Partnership	YES	YES	YES	NO	NO

Table 3.4: A summary of the characteristics of the different sites.

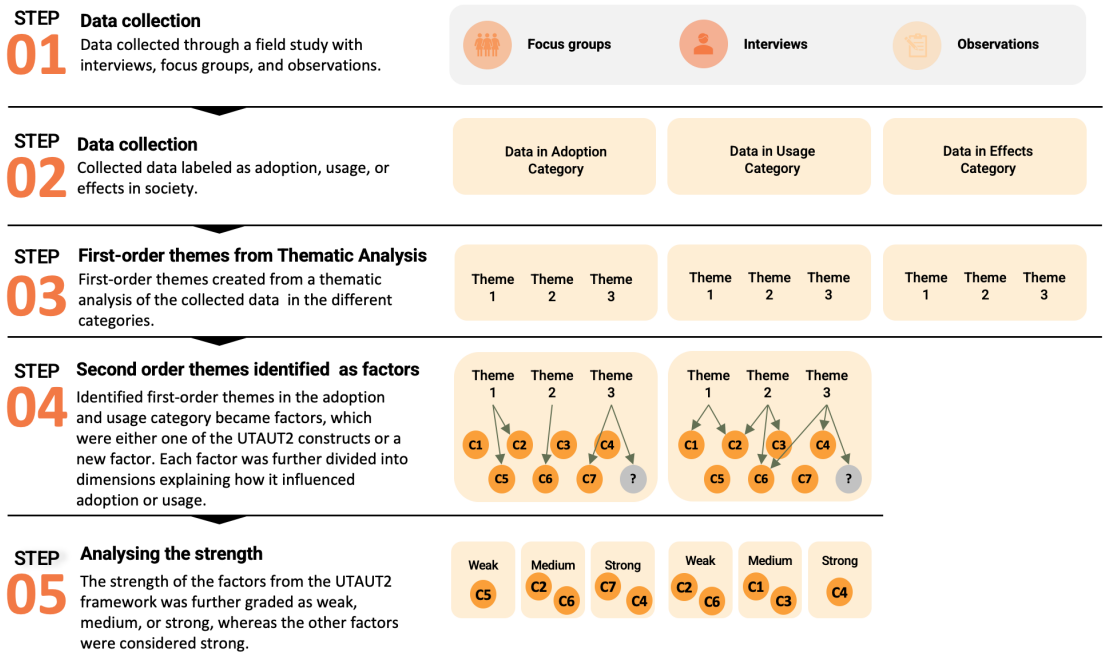

Figure 3.13: The data was collected through a field study and then analyzed in different steps to answer the aim of the study.

3.5 Quality criteria

According to Bell et al. (p.58,363) the trustworthiness of research is of high importance. In a case study, this could be maintained by ensuring dependability, credibility, transferability, and confirmability. How the research ensured this is presented below.

In adherence to the principles of dependability, as mentioned by Bell et al. (2019, p.363), documentation and records were maintained throughout the entire research process. Also, the research process has been described in detail in the methods chapter to increase transparency and establish a foundation of reliability. Further, by selecting areas provided by MFA as geographical boundaries, already established relationships of MFA could be used. Here, personnel from MFA played a pivotal role in enhancing trust but also in bridging linguistic barriers by facilitating translation into the local language. This strategic approach both contributed to and enhanced the reliability of the obtained answers, as well as increased both participant comfort and security.

Furthermore, the above-described documentation served a dual purpose as it also affected the credibility or internal validity. The research findings were thoroughly documented and systematically shared throughout the process. Furthermore, they were discussed with participants to ensure accuracy and validate the authenticity of the obtained information. This aligns with the principles of respondent validation as proposed by Bell et al. (2019, p.363). In instances where observations were

conducted, the researchers verified the observed phenomena by posing questions during interviews, both with customers and MFA. This approach helped confirm the accuracy of interpretations and reinforce the overall credibility of the research findings. This was further considered especially important to mitigate inadvertently influence on the participants' behavior or alter the natural course of events arising from the researchers' presence during the observations and focus groups (Bell et al., 2019, p.414).

Achieving transferability, or external validity, of results posed a challenge to the project (Bell et al., 2019, p.365). The study primarily focused on women in rural Zimbabwe, so findings might not be directly applicable to other, yet similar settings. In other words, the contextual factors and characteristics of the studied case influenced the applicability of the findings to other settings. However, the research sought to enhance this applicability by giving rich explanations of the context, found in subsection 3.3.2. This method is referred to as a "thick description".

The contextual background and company background provide a comprehensive description of both the country, the site, and the company. This detailed portrayal offers an understanding of the specific context in which the women under examination were described and interviewed. By providing intricate details, the research helps others make informed judgments about the potential transferability of the findings, which according to Bell et al.(2019, p.365) is essential for achieving transferability.

Another important aspect to emphasize is the research's time frame. The research was designed as a snapshot in time, offering insights into e-mobility adoption at a particular moment. Consequently, it may not capture longitudinal changes or account for seasonality or other temporal variations. Despite this, the study highlighted both structural and social components within the context. While acknowledging regional variations, particularly in diverse development contexts, certain aspects of the results remain relevant and applicable to other geographical areas.

3.6 Ethical considerations

In the realm of business research ethics, four distinct areas merit consideration: Avoidance of harm, Informed Consent, Privacy, and prevention of deception (Bell et al., 2019, p.114). The principle of Avoidance of harm entails ensuring that all individuals involved in the research, directly or indirectly, are safeguarded from harm.

This project adopted a feminist ethnography, focusing on women's experiences and activities — a crucial emphasis given that women's experiences have often been relegated to marginal and subsidiary status compared to men's (Bell et al., 2019, p.419). However, the extensive gender focus introduced potential ethical complexities, particularly concerning harm prevention for both MFA and other participants in the study.

It is important to acknowledge that the field study took place within a distinct social context and culture unfamiliar to the researchers. This acknowledgment held heightened significance during the interviews, where societal gender roles could pose risks for the women participating in the study. Consequently, the principles of informed consent and privacy became particularly important, ensuring that participants were fully aware of their involvement and confident that the information they provided would be handled with care (Bell et al., 2019, p.122). Therefore, upholding individual anonymity, which is underscored by Bell et al. (2019, p.116), was essential. This was achieved through data segmentation and withholding of individual data. To further mitigate any potential lack of informed consent, a representative from MFA accompanied the researchers, facilitating translation and ensuring that information was provided in both English and the local language, Shona.

4

Mapping of each site

The following chapter presents the data from the observations, focus groups, and interviews at the different sites. Firstly, the general observations will be presented, as these observations apply to all sites. Furthermore, specific observations will be presented together with the focus groups and interviews. These will be divided into different sites, to extract the differences and similarities from the sites and their unique discussions. The presented data have further been summarized and categorized as themes either influencing adoption, usage, or effects in society. Table 4.1 summarizes the different underlying themes found in the different sites and from the observations.

Site	Adoption	Usage	Effects
Observations from all sites	• Effects in society • Business mindset	• Limited battery reach • Business mindset • Increased confidence	• Increased confidence
Domboshava	• Livelihood improvement • Community dynamics and societal expectations • Demand for mobility	• Perceived ease of use • Encouragement from other drivers	• Economic empowerment • Increased livelihood • Improved last-mile transportation
Wedza	• Effective work tool • Economic benefits • Encouragement from other drivers	• Physical placement and current business activities • Existing support infrastructure	• Economic empowerment • Changed perceptions of the Hamba • Increased independence • improved technical knowledge
Watsomba	• Openness to find new activities • Gender-friendly design • Determination to overcome transportation challenges • Support from family • Encouragement and closeness	• Evolved habits • Gained social status • Goals and aspirations	• Economic benefits • Increased livelihood in the community
Chipinge	• Effective work tool • Enabler for new projects • Limited mobility • Influence of early adopters	• Accessible spare parts and technical support • Adaptation of routes • Insufficient infrastructure and high demand for mobility	• Increased productivity and efficiency • Increased product quality • Increased respect in society • Increased livelihood
Honde Valley	• Economic benefits • Community development • Limited last-mile transport • Social influences • Increased status in society • Perceived ease of use • Support from family and community • Mobility For Africa's Interference		

Table 4.1: The different themes found in all of the sites. These themes are further categorized based on adoption, usage, and effects.

4.1 General observations from all of the sites

From the observations, some general themes that influenced the adoption and usage could be found. These were *effects in society*, *Limited battery reach*, *business mindset*, and *increased confidence*, which are further described below.

Effects in society

In all the sites where MFA had already established its operations, it was clear that the demand for the Hamba was high and that seeing others use the Hamba influenced others to also want to adopt the Hamba. For example, during the site visits, it was common for people to come to the station and ask if they could buy a Hamba. As they had seen the effects it had generated on others and in the community, they were eager to implement it into their own daily business.

Limited battery reach

Although the Hamba has contributed to more efficient day-to-day activities, the Hamba can only travel around 80km before the battery needs to be changed. This limits the Hamba drivers to not going further away than their closest, and usually only, battery charging station. For many users, this means that their routes and daily work routines have had to change to adapt to fit the infrastructure of MFA. The male participant, however, continues by saying that most people don't need to travel further than 80km and that the Hamba still is better than having a fuel car

Business mindset

During the community engagements, it was observed that many women wrote, calculated, and broke down numbers connected to earnings and the cost of operating the Hamba. Furthermore, some questioned the costs of having the Hamba and asked about potential revenue streams, indicating a business mindset among the women.

Increased confidence

The women who had adopted the Hamba showed confidence and no lack of fear before, during, and after the focus group discussions. Instead, most women raised their voices as men and women passed by and they were not afraid to talk about their struggles or come up with suggestions on how to change the Hamba.

In some areas, the orange-colored helmet had become a sign of driving a Hamba, which led to women drivers walking around with the helmet even though they were not using the Hamba.

4.2 The case of Domboshava

In Domboshava there was an ongoing land subdivision at the time of the visit, which implies there were a lot of construction projects fueling its prosperity. It was observed to be something that Hamba drivers had taken advantage of, by starting businesses of driving construction materials. As the activity in the area was high, the competition was observed to be stronger than in the other sites and there existed two types of direct competition at the moment. These were petrol tricycles and pushed carts. This was further highlighted by an employee from MFA, who said that the competition in Domboshava was one of the reasons the company was pushed to change to the lease-to-purchase model. The employee further mentioned that the model was later copied by competition in the area, indicating the success of the business model in the community.

In the following sections, the reasons that influenced the women's decision to adopt the Hamba in the area will be discussed. Subsequently, what has influenced the usage of the Hamba will be presented, followed by an examination of the effects seen from the implementation of the Hamba. A summary of what was found to influence adoption and usage and which effects were seen in Domboshava is presented in Table 4.2.

Adoption	Usage	Effects
• Livelihood improvement • Community dynamics and societal expectations • Demand for mobility	• Perceived ease of use • Encouragement from other drivers	• Economic empowerment • Increased livelihood • Improved last-mile transportation

Table 4.2: The different themes found in Domboshava categorized based on adoption, usage, and effects.

4.2.1 Influences on the adoption of the Hamba

What influenced the women to adopt the Hamba were *livelihood improvement, community dynamics, and societal expectations,* and *demand for mobility.* These are further described and motivated below.

Livelihood improvement

Something that influenced the women's decision to adopt was the expectancy of a better livelihood. For example, a woman from the focus group in Domboshava said "*The Hamba seemed easier compared to my previous work, which involved buying and selling. The Hamba provided me with a more flexible and easier way to work*" (F4). A second woman expressed "*The Hamba seemed beneficial because it was helping other women. I found the technology and the surrounding business interesting and supportive and I believed that adopting the Hamba would help me contribute meaningfully to my community and family*" (F4).

The expected improvements in livelihoods for the community were also highlighted by women who chose not to use Hamba. Their reluctance to adopt Hamba themselves was instead due to concerns that it would be difficult to transition from their existing income-generating activities to new ones involving Hamba. One woman, who chose not to apply for the Hamba, explained "*My decision to not apply was based on the inability to manage both driving the tricycle and my other work responsibilities*" (W2). She explained that her financial constraints and current low business activity present significant barriers to her acquiring a Hamba. Despite this, she acknowledged that owning a Hamba would enable her to expand her business and increase her income as it would enable her to be more flexible and transport her goods. She also mentioned, "*I am happy that the Hamba does exist in my community and I can see the positive impact of the Hamba on society. Thanks to the Hamba, people can more easily and cheaply get flexible transport*" (W2). Besides this, she mentioned, "*Although I do not own the Hamba, I can still benefit from it by utilizing the drivers for transportation, saving me time and effort*"(W2).

Community dynamics and societal expectations

The decision to adopt the Hamba was also influenced by community dynamics and societal expectations for most women. The women expressed that while some community members supported the initiative to apply, others found it unconventional for women to be involved in the transport industry. One woman says *"Some people think that it's weird for women to actually be in the transport industry and doing the taxi business"* (F4). In addition to this, one woman explains that it took a while to accept the technology and be a part of the project as she was scared of the acquiring process. She explained that her lack of formal background together with discouragement from other women made her believe she would not be able to manage to apply for the Hamba. She explains "*The other women were discouraging us from actually joining the project. So, they would just be saying things like it's difficult, it's hard to actually do the interview, to qualify for the project. So, we became a bit reluctant to come and actually do the interview*" (F4).

Despite this, the women decided to adopt the Hamba. Some still emphasized that a share of positive experiences and support from other women who were already part of the project and had experienced empowerment and increased economic status played a crucial role in influencing the women's decision to join. Also, family support and societal acceptance were considered in this decision-making process. However, the women mentioned that, in the end, they decided to join the project despite societal opinions, because they needed to make a living. One woman says "*So at a community level, some people actually supported us. They thought that it was a good initiative, but, also some people think that it's weird for women to actually be in the transport industry and doing the taxi business. So then it was a personal decision that I had to make a living. So, because I need to make a living I just had to make a strong personal decision to come and join the project"*(F4). Another woman mentioned, "*I eventually took sort of the risk because other women are doing it...let me just join the program because other women are doing it and I'll just see when I'm there how I am doing it*"(F4). Another woman added "*I just motivated myself, I would find my*

own personal strength to just do it and just see how it goes as a woman" (F4).

Demand for mobility

One woman who did not apply for the Hamba specifically mentioned that the Hamba's ability to navigate through narrow and difficult-to-reach places is something she sees as a distinct advantage over other transport options. She mentioned that "*...This type of transportation is highly demanded in the area and many people today have to walk long distances as cars or other vehicles are too big or unwieldy to reach the areas*" (W2). The woman also highlighted the significant value she sees in owning the Hamba. She noted that "*...Owning the Hamba would eliminate the need to pay for transportation and provide me with greater flexibility*" (W2).

4.2.2 Influences on how the Hamba was used

What influenced how the women used the Hamba in Domboshava were *perceived ease of use* and *encouragement from other drivers*. These are further described and motivated below.

Perceived ease of use

The women found it relatively easy to transition to using the Hamba compared to their previous occupations (F4). The absence of capital injection into the project reduced financial risks compared to other or previous businesses. One woman explains "*The Hamba was easier for me because there's actually no capital injection into the project, unlike the buying and selling business, where I had to raise capital and buy some goods. For example, I had a food cart, a takeaway food cart. Sometimes I would buy food items to sell, but then when nobody bought them, they would end up rotting in shops. So the Hamba sort of de-risked my way of living, my way of making money, unlike the other projects which they were doing*"(F4). However, when it comes to the perceived use, one woman mentioned how she initially hesitated to join the project due to her lack of formal work background and fear of failure during the interviews by MFA, which are part of the acquiring process. The woman explained *"I was very adamant about doing the interview. Because I thought it was difficult. Some people would actually say it was difficult. I had no formal work background. I used to do stone-blasting for a living. So, I was quite afraid to do the interview, because I thought that probably I would fail. So, it took me a while to be persuaded actually to come and join the project*" (F4). Despite this, she eventually joined, finding the project empowering.

In contrast, other participants found driving the Hamba easier than their previous occupations and when they learned how to operate it completely, they also found it fun. One woman explained "*The Hamba project was easier for me because the work that I did was a bit difficult. I was into buying and selling, so, that was a bit difficult for me. That's why I decided to transition to the Hamba project because it's more flexible and easier to work using the Hamba*" (F4). The women mentioned that despite facing challenges such as bad roads and infrastructure, they found the experience of using the Hamba empowering and enjoyable.

Encouragement from other drivers

The women explained that women who had already been using the Hamba shared their experiences and provided support and guidance to those who were new to driving the Hamba (F4). One woman said, "*We advise each other on how to do business. Especially the experienced drivers share with the new ones*" (F4). Another woman explained "*I told one of the new drivers that they have to be positioned in one place so that people know where to find her, if you go to different places people will not know where to find you and you will not get as many customers*" (F4). This peer support network not only helped the new Hamba drivers learn how to use the technology but also provided them with the confidence and encouragement they needed to overcome any initial hesitation or challenges.

4.2.3 Effects seen after the implementation of the Hamba

The identified effects seen from the implementation of the Hamba in Domboshava were *economic empowerment, increased livelihood,* and *improved last-mile transportation*, which are all further described below.

Economic empowerment

The women in Domboshava expressed that they were happy to adopt the Hamba as it has given them economic empowerment. One woman mentioned "*Adopting the Hamba empowered me to raise money for my children's school fees, food, and other household items. I felt undermined by men and saw the project as a means to empower myself economically*" (F4).

Increased livelihood

According to the women, the Hamba have become an essential part of their daily lives, serving work and personal needs, allowing them to buy assets and provide for their families. The women expressed that they could not imagine life without the Hamba, as it has become an indispensable tool for transportation and livelihood. They mentioned using the Hamba daily for various purposes, including commuting, fetching water, attending church, gardening, harvesting, and shopping. One woman explained "*The Hamba project that has actually sort of changed the way people live. People nowadays, now they don't want to walk anymore. They prefer using the Hamba. So people are no longer walking as much as they used to. They use the Hamba as transportation. So it has sort of changed the lifestyle in the area*" (F4).

Improved last-mile transportation

The women expressed that the Hamba has reduced the need for walking and improved last-mile transportation within the community. One woman explains "*Before the Hamba was introduced people would use a wheelbarrow from the bus stop, to go back to the house with the stuff. So now that we have the Hamba we now have the last-mile transport to the house directly from the bus stop*" (F4). When asked what would happen if the Hamba was taken away, one woman also answered "*So, besides the work that we are doing with their Hamba, the Hamba helps us at home. Now, we are no longer hiring transport because we actually have our own transport system*

at home. So, by taking the Hamba away from us, you would have actually reduced the transportable system that's now in place. It's also going to change their way of living, even the community's way of living."

4.3 The case of Wedza

At the time of the visit, Wedza was the only site where the Hamba had been offered solely to women. According to the staff of MFA, approaching only women in the pilot project aimed to empower female drivers, reflecting a concerted effort to challenge prevailing gender dynamics.

In the following sections, the reasons that influenced the women's decision to adopt the Hamba in the area will be discussed. Subsequently, what has influenced the usage of the Hamba will be presented, followed by an examination of the effects seen from the implementation of the Hamba. A summary of what was found to influence adoption and usage and which effects were seen in Wedza is presented in Table 4.3.

Adoption	Usage	Effects
• Effective work tool • Economic benefits • Encouragement from other drivers	• Physical placement and current business activities • Existing support infrastructure	• Economic empowerment • Changed perceptions of the Hamba • Increased independence • improved technical knowledge

Table 4.3: The different themes found in Wedza categorized based on adoption, usage, and effects.

4.3.1 Influences on the adoption of the Hamba

What influenced the women to adopt the Hamba were *effective work tool, economic benefits*, and *encouragement from other drivers*. These are further described and motivated below.

Effective work tool

Many women expressed the importance of having a work tool, like the Hamba, which can help them fetch water and firewood. One woman said "*I applied for the Hamba because I saw the importance of the Hamba as a tool, which I can use to go and fetch firewood, fetch water, fetch water. Because the place where I'm going is far away, the water is far away. When I realized that the Hamba could assist me, I decided to apply*" (F1).

Economic benefits

Many of the women mentioned that the match between their economic and financial situation and the business model of MFA was one of the main reasons for adopting

the Hamba. This as the business model of MFA allowed them first to earn money with the Hamba before they started paying for it. One woman said, *"People asked me: Why not consider getting a small car? So, then I said: Then give me the money to buy the car, but there was no money, and that influenced me to apply for the Hamba instead*" (F1). The women further said that even if there was disapproval from their community or their husbands in getting the Hamba, they decided to apply for it as they saw the economic benefits as larger than the costs. Another woman said *"The men within the community said: No, no, no, don't let our women join this program, because they might all become promiscuous, and they start to do their own thing. But, because of the needs inside the house, and maybe financial needs, and because it was something that could benefit me financially I thought I would just risk it, and apply for the Hamba"* (F1).

Encouragement from other drivers

As some of the women in Wedza were a part of the initial pilot project in 2019, they decided to apply for the Hamba without knowing its benefits, indicating a strong belief in how it could help them in their business and household. However, other women who applied for the Hamba at a later stage said that the decision was influenced by observing the initial Hamba drivers in the community. One woman said, "*Initially, I was the second phase customer, so I had seen the observed how the Hamba worked and what benefits there is. I saw it could work for me so I decided to apply*" (F1).

4.3.2 Influences on the Hamba was used

What influenced how the women used the Hamba in Wedza were *physical placement and current business activities*, and *existing support infrastructure*. These are further described and motivated below.

Physical placement and current business activities

The women explained that where they live, how long distances are, and what economic activities they are having play a major role in how they are using the Hamba. One woman said "*I love the Hamba because being a farmer, the Hamba has allowed me to be able to travel long distances. I live for example 5-10 km away from this trading center. Now, I can do chores like getting firewood, harvesting my crops, carrying my crops, and other farming chores. I am also able to travel more quickly*" (F1). Furthermore, another woman says "*I'm a poultry farmer, so when I get stock feeds, I'm able to come and collect my stock feeds using the Hamba and drive to my home. If I slaughter my chickens, I then use the Hamba to carry the chickens and deliver them to the market*" (F1).

Existing support infrastructure

Thanks to the training and support from technicians provided by MFA the women mention feeling more confident in how to operate the Hamba which affects how they use it. One woman stated, *"We are not just driving it! When we hear certain noises we will investigate what has happened and they will communicate with the*

very helpful technicians" (F1). Thanks to the local technical support the women perceive the use of the Hamba as more positive, they dare to try new things and make full use of it. As one woman said, "*Every time there is any problem, I will call the technician and they will come to fix it*" (F1).

4.3.3 Effects seen after the implementation of the Hamba

The identified effects seen from the implementation of the Hamba in Wedza were *economic empowerment, changed perceptions of the Hamba, increased independence*, and *improved technical knowledge*, which are all further described below.

Economic empowerment

The women acknowledged that due to them using the Hamba to drive people and cargo they have been able to contribute to their household economy and to the community. "*Now that I have the Hamba, I go and look for a financial contribution, to get some income, and at the end of the day, we are all contributing. Now, there are even fewer misunderstandings within the family setup*" (F1)

Changed perceptions of the Hamba

The women emphasize that as the benefits of using Hamba became more apparent for the family members and other people in the community, the negative perceptions shifted positively, and more and more people in the community started to accept and want it. One woman said, "*...And now that I am having the Hamba and using it, my family members are now seeing the utility of the Hamba*" (F1).

Increased independence

One woman who has had the Hamba since 2019 says with pride and a large smile "*Before, we were very low in social status. But now I can even buy the lotion of my own choice and I can buy any type of bathing soap. So I am very, very thankful because our lives have changed now because of the Hamba*" (F1). Another woman states "*I am happy because now as a woman, I have something that I own. I can say that this is mine and that I have worked for it*" (F1).

Improved technology knowledge

Due to their opportunity to acquire a Hamba, the women say that they have become more skilled in technology and mobility, slowly making them more confident and used to driving. Some of the women mentioned that they now know the road rules, which has made them less afraid of using other moving vehicles. One woman said "*Before, when we saw a truck along the way, we would rush off the road and get in fear of passing by other vehicles. But now when we drive the Hamba we are more confident and we are very much aware of our rules, regulations, and rights on the road*" (F1). Furthermore, she stated, "*So, we are happy because we are now able to drive and now we can appreciate the road rules and regulations*" (F1). The women further acknowledged that they are now more aware and skilled in how the Hamba works and how to operate it. Now they understand the dashboard, when to stop,

and when to continue. They understand the limits of the Hamba how far it can go and where the battery can take them.

4.4 The case of Watsomba

Compared to the other sites visited, Watsomba was the first one where MFA introduced the Hamba on its own, without any local partnership. This meant that MFA had to build trust with the community from scratch, without taking advantage of an already established business. This made the deployment process more protracted, and it took the company 7 months to get the Hamba distributed to potential customers. However, despite the extended process, the interest in Hamba was witnessed to still be high among the people in the community.

In the following sections, the reasons that influenced the women to adopt the Hamba in the Watsomba will be discussed. Subsequently, what has influenced the usage of the Hamba will be presented, followed by an examination of the effects seen from the implementation of the Hamba. A summary of these is presented in Table 4.4.

Adoption	Usage	Effects
• Openness to find new activities • Gender-friendly design • Determination to overcome transportation challenges • Support from family • Encouragement and closeness	• Evolved habits • Gained social status • Goals and aspirations	• Economic benefits • Increased livelihood in the community

Table 4.4: The different themes found in Watsomba categorized based on adoption, usage, and effects.

4.4.1 Influences on the adoption of the Hamba

What influenced the women to adopt the Hamba in Watsomba were *openness to find new activities, gender-friendly design, determination to overcome transportation challenges, support from family,* and *encouragement and closeness.* These are further described and motivated below.

Openness to find new activities

Some individuals faced consequences in their earlier businesses and were actively seeking alternative revenue streams. One woman says *"I faced some consequences in my business. So, when I heard about the Hamba I came faster faster faster"* (F4). When they heard about Hamba, they saw it as an opportunity to generate additional income. They believed that the Hamba could offer them a more profitable solution, thereby preventing idleness and keeping them engaged in productive activities. Another reason expressed by the women was the desire to engage more in society. One woman expressed a desire to become active, saying, "*So, I didn't want*

to just sit at home. So when I heard about the Hamba, I was interested because I would not be still, I would be moving around" (F2).

Gender-friendly design

The woman emphasizes how the Hamba is perceived as gender-friendly, providing a different experience compared to other vehicles. One woman says "*It's gender friendly, it's different from the other vehicles. I don't have to struggle and I can carry a lot of stuff. And it doesn't use fuel. So, when Mobility for Africa explained to us about the whole process, we just noted that this Hamba would assist us and it's something that is going to be helpful to us*" (F2).

Determination to overcome transportation challenges

One woman emphasized that she faces challenges with having to walk long distances. She says, "We are walking long distances from where we stay, struggling to get to the clinic and marketplaces. That's why I am here. So if I had a Hamba it would help me to transport sick people to the clinic" (W1). Many women further mentioned the transportation challenges, and despite initial doubts and negative feedback from society, the women mentioned that they remained determined to adopt the Hamba. Concerns about repayment, accidents, and doubts about women's ability to drive were prevalent. One woman mentioned "*So, people where saying that is this even suitable for this road? We don't need this in the road. Looking down on women. Are they able to drive?*"(F2). However, the women were focused on overcoming transportation challenges and were determined to adopt the Hamba. As one user mentioned, "*We almost lost hope because people were just saying, 'What if you fail to pay the amounts that are being required at Mobility for Africa? What if you get into an accident? What if a big truck comes and hits you while you're driving?'*" (F2). Despite societal skepticism, the women were determined to overcome transportation challenges.

Support from family

The women mentioned that support from the family played an important role in their adoption. While some family members initially doubted the technology, the women mentioned that witnessing its benefits eventually led to their support and excitement. One user shared, "*My family is very excited that I'm driving the Hamba, and I've been sharing the pictures with my relatives, and we are so very happy that we are driving the Hamba*" (F2. Another user explained, "*At first, my husband was very doubtful. Now that we are driving, he is helping me find new customers and other deals. So, I had faith. I believed in Mobility for Africa when they came and told me about the Hamba before I even had seen it*" (F2).

Encouragement and closeness

Mobility for Africa's support and training were instrumental in encouraging the adoption of the Hamba by the women (F2). The women mentioned that they felt empowered and supported, realizing the potential benefits of incorporating Hamba into their daily lives. As one user mentioned, "*Mobility for Africa helped us, and we*

didn't have much hope, but they were very, very encouraging and helped us when we went to training" (F2). The free services offered by Mobility for Africa further incentivized adoption, making the technology accessible to a wider audience. Another user stated, "*If it was just going to be in the shop, I would not going to buy it. But then the encouragement and the training made me want it more*" (F2).

4.4.2 Influences on how the Hamba was used

What influenced how the women used the Hamba in Watsomba were *evolved habits, gained social status,* and *goals and aspirations*. These are further described and motivated below.

Evolved habits

Although the women in Watsomba only had used the Hamba for two months, they had integrated Hamba into their daily routines, forming habits around its usage. For many, the Hamba became an indispensable part of their lives. One user expressed, "*So, we are now used to just driving and going out and about. That's our main source of income now.*" F2). They have developed routines and habits centered around Hamba, making it their primary source of income.

Gained social status

The use of the Hamba has led to various social and economic benefits for women, including increased social interactions and the formation of new friendships. One user mentioned, "*So, people didn't talk to us before, and we now have more friends because people want to talk to us now because we are driving*" (F2). The women emphasized finding joy in showing off their Hamba, describing it as fun. This benefit was something that made them enjoy using the Hamba and influenced how it was used and which routes were taken.

Goals and aspirations

By having the Hamba, many women had developed new goals and aspirations in their lives, which motivated them to use the Hamba to generate more income. For example, one woman mentioned, "*I'm looking forward to excelling in expanding to other business projects like poultry farming (chicken farming) and other businesses that will help me increase my income*"(F2). Another woman continued "*So, I really want to go back to school. So, I didn't have the chance to finish school because of money issues, but I'm hopeful that Hamba will help me increase my income to send me back to school*"(F2). Others also expressed a desire to invest in other projects such as building houses and obtaining proper driving licenses. As one woman expressed, "*So, I'm looking forward to raising more money for my driving license and also to open a new shop and start doing my business*"(F2).

4.4.3 Effects seen after the implementation of the Hamba

The identified effects seen from the implementation of the Hamba in Watsomba were *economic benefits* and *increased livelihood in the community*, which are all further

described below.

Economic benefits

The women mentioned that they had experienced an increased income, enabling them to afford better food and improve their living standards. One woman stated, "*we are now eating good food in our houses*"(F2). While some users may not have seen immediate financial transformations, they remained optimistic about the future. As one user stated, "*I haven't seen the income rise. I haven't seen the transformation yet. But I'm expecting maybe later on since I've just joined for two weeks*"(F2).

Increased livelihood in the community

The women mentioned that by having the Hamba, they also try to contribute to their communities. One woman said "*As for the community, we are helping elderly women to go to churches and hospitals. And those who are sick in the community, we are offering services for transport to help them to go to the clinic*"(F2).

4.5 The case of Chipinge

At the time of the visit, Chipinge was that was considered to have the strongest patriarchal culture. One employee of MFA said that some women drivers in the area are finding it difficult to be a Hamba driver because they are competing with their male counterparts. Furthermore, back home with their families and husbands, it is also not easy as the women witness the difficulties in balancing the relationship at home and work. The staff of MFA further said that some women have gotten complaints from their husbands for working with both men and women.

In the following sections, the reasons that influenced the women to adopt the Hamba in the Chipinge will be discussed. Subsequently, what has influenced the usage of the Hamba will be presented, followed by an examination of the effects seen from the implementation of the Hamba. A summary of these is presented in Table 4.5.

Adoption	Usage	Effects
• Effective work tool • Enabler for new projects • Limited mobility • Influence of early adopters	• Accessible spare parts and technical support • Adaptation of routes • Insufficient infrastructure and high demand for mobility	• Increased productivity and efficiency • Increased product quality • Increased respect in society • Increased livelihood

Table 4.5: The different themes found in Chipinge categorized based on adoption, usage, and effects.

4.5.1 Influences on the adoption of the Hamba

What influenced the women to adopt the Hamba in Chipinge were *effective work tool, enabler for new projects, limited mobility*, and *influence of early adopters*.

These are further described and motivated below.

Effective work tool

Several women emphasized that they adopted the Hamba due to its role as a critical work tool, especially for tasks like fetching water and firewood. For instance, one woman stated, "*The Hamba helps me bring my produce to the business center*" and "*I use it for last-mile mobility*"(F5). This statement is repeated in several interviews, underlining the reason for adopting the Hamba is highly influenced by it being an effective tool, used to improve daily work (L2, F5, F6). One man says "*We are farmers. The objective of getting them was to ferry milk from the farms to the milk collection center. The farmer can produce maybe well over 20 liters to transport it from home. You have to put it in the can on the head, then you travel all the way. So in this terrain now, it becomes difficult. Sometimes when it gets rainy like these days, one can fall down because it's slippery. So with the Hamba, if I put 30 or 40, 50 liters of milk, I put all that on my Hamba, then I drive to the center. I make sure that all the milk comes to the center*"(L2).

Enabler for new projects

Many women pointed out how the business model, allowing them to earn before paying, made acquiring the Hamba not only an attractive but also a feasible option. It was further explained that this acted as a catalyst for the people, enabling them to start new projects from the money they earned. As one woman said "*Initially we did not have the capital to do other projects. To save money, we started what we call the Round Table, so as the Hamba did not require capital injection, it was seen as an enabler for further projects*"(F5).

Limited mobility

It was clear from the focus groups with both the men and women that transport is generally lacking in the area. One man said, "*So, you see, the reason why I applied for the Hamba is because I am a farmer. So, I wanted to use the Hamba as a source of transport to transport my maize from the farm field to the market*"(F6). This was also mentioned by the women, who said that transport was the main reason for them to apply. More specifically one woman who was into dairy farming said "*I saw it as an opportunity to actually have some means of transport, which I can use to help myself*"(F5). A man also explains the importance of the mobility issue it solves by saying "*Once it is there, it helps a farmer to do everything. Not just milk. As I said earlier on that we need to firewood, we have feed, we have patients that need to be taken to the clinics. So, once they are there, it improves the life of a person to another level*"(L2). Another woman, not interested in adopting the Hamba due to her not having time as she has to run her business, also emphasized the last-mile benefits that the Hamba provides, and says, "i*t's been helping the people most transport-wise. Because there's some areas where the small cars couldn't reach. So, their Hamba goes to that last mile, so it's been helping them*"(W3).

The women also witnessed that due to lacking transport, the prices for transport were very high, and most people were being overcharged when bringing their goods

to the town or market (F5). This was further highlighted in the focus group with the men, where a man said "*the most common transports, Mushikashikas, charge high prices for carrying people's goods, leading to many farm produce being left at the farms to rot*"(F6). Furthermore, it was highlighted by another man in the same focus group that "*It is cheaper to use the Hamba than to use the Mushikashika*" (F6). This is also highlighted by a woman who said "*Without the Hamba, the produce would rot at the field because I cannot take the produce to the market. So before most of my produce would rot in the field and I would work for nothing*"(F5).

Influence of early adopters

Early adopters have played an essential role in the community's acceptance of the Hamba. Those who participated in the initial pilot were seen as role models. The positive experiences and the visible benefits they gained from using the Hamba encouraged others to adopt it. One woman and one man mentioned that seeing other women driving the Hamba encouraged them to apply for it (W4; F6). One woman explains "*I was not hesitant to make a decision. But in the beginning, I was hesitant because I thought it would be a challenging job. At the time, they were using the old model and therefore working in pairs. Then they had to fight to make things work, but eventually, more people wanted to be part of the program because we saw their achievements*"(F5). Furthermore, a community leader said *"The main reason why some people did not apply for the Hamba at first was that they wanted to see how people operated the Hamba and how they were going to benefit from it before applying themselves"*(L1).

4.5.2 Influences on how the Hamba was used

What influenced how the women used the Hamba in in Chipinge were a*accessible spare parts and technical support, adaptation of routes,* and *insufficient infrastructure and high demand for mobility* These are further described and motivated below.

Accessible spare parts and reliable support

One thing that was highlighted especially by the male participants, but that seemed to have less influence on the women was the availability of spare parts and reliable support. One male participant mentioned that Mobility for Africa has established a local presence, providing easy access to services whenever needed (L2). He says, *"It's a good relationship. And we expect to go a long way with Mobility for Africa. Because as long as we are using the Hamba, we shall continue to need the service. And we are going quite a long way with them. What we don't want now is for them to leave this place, because once they leave this place, they won't get that service anymore"*(L2). The proximity ensures that farmers can get timely maintenance and support for their Hamba and ensures an understanding of the farmers' needs.

According to the male participant, the local service centers and technicians provided by Mobility for Africa have played a crucial role in maintaining operational efficiency (L2). He further explained the challenges faced by farmers using fuel-powered vehicles, which often suffer from durability issues and inconsistent repair services.

Several instances are mentioned where fuel-powered vehicles broke down and became non-operational, leaving farmers without reliable transportation. In contrast, the Hamba has proven to be more reliable and maintainable due to the support structure in place. He further stated that for fuel-powered vehicles, the availability of spare parts and repair services is not as consistent. Once these vehicles break down, getting them repaired can be challenging. However, he also mentions problems with the batteries emphasizing how they become greatly affected when new charged batteries are not available. He says, "*I have a single battery in my Hamba. When I want to swap it, there's sometimes no spare battery. So I have to leave the bike here until that battery is recharged. Then I'll come sometime later, a day or two, then get the battery back. So when I come here, there's no immediate battery for me to take to swap with the one that I have. It means to say I have to go by foot it back because there's no means of driving without a battery*"(L2).

The women are however enhancing the importance of the supporting system by saying that problems with batteries sometimes hinder them from working, hence implying that they need to adapt their intended schedule for the day. More specifically one woman says, "*Shortage with batteries, sometimes there are very few batteries or the batteries are unable to charge because of the bad weather and on grid power and then we cannot work because they don't have the batteries*"(F5).

Insufficient infrastructure and high demand for mobility

Due to the lack of other last-mobility services and insufficient infrastructure in the areas, the demand for mobility services among the citizens has been high. Therefore, many Hamba drivers have been using the Hamba as a taxi service, driving these people to where they want to go (F5, F6). In discussions with male focus groups, participants highlighted how the Hamba has been used to further support community members logistically. For instance, one man described "*Well, it is helping a lot of people in the areas where we are staying. In some places, we have really bad roads where cars can't reach, meaning we can't use Mushikashika or any sort of vehicle there*"(F6). This quote demonstrates how the usage of the Hamba has been affected by the opportunity to provide transportation solutions in areas with poor infrastructure, which are otherwise inaccessible. This was also emphasized in a focus group with the women, where one woman said, "*So, the community is actually benefiting because the Hamba goes everywhere, it can go even on bad roads. And it's the means of transport in the community*"(F5).

4.5.3 Effects seen after the implementation of the Hamba

The effects seen by the men and women from the implementation of the Hamba in Chipinge were *increased productivity and efficiency, increased product quality, increased respect in society,* and *increased livelihood* which are all further described below.

Increased productivity and efficiency

The productivity gains from using the Hamba have been significant for the users,

especially in agricultural contexts. Users reported more efficient farming operations and easier access to markets, which in turn increased their economic activity. For example, a man using the Hamba described, "*I'm a poultry farmer, so when I get stock feeds, I'm able to come and collect my stock feeds using the Hamba and drive to my home*"(F6). Further, a community leader reflected on this by noting, "*Before people only carried a small amount because that's what they could carry using their heads. But now they can carry large amounts of goods... So, now produce doesn't have to rot in the gardens. Instead, they can bring more and make more money*"(L1). this is also highlighted by a woman who said "*Now I don't have to carry the stuff I sell on my head, I can actually move around neighborhoods and sell my produce*"(F5). Lastly, One male milk farmer notes, "*So with the Hamba now, things are convenient. If I produce 30 or 40, 50 liters of milk, I put all that on my Hamba, then I drive to the milk center*"(L2).

Increased product quality

The Hamba has not only facilitated easier transport of goods but has significantly enhanced the quality of the produce. A milk farmer explained "*The Hamba has improved our quality of milk. Because, some of the farmers in the area had to transport the milk for 8 km to the milk center, which earlier was done by foot. So, when they are using the Hamba, the milk can be transported more quickly and therefore can reach the cooling tank faster. This has decreased the TBC, total bacterial count, of the milk*"(L2).

Increased respect in society

The Hamba has also facilitated empowerment for its users, leading to improved social status within the community. This is particularly evident among women, who report increased respect and economic autonomy within their communities. A woman from one of the focus groups explained "*Being part of the program empowered us because we were a bit backward. We could not afford certain things in our lives, even basic things... We can now buy food, and contribute to our household*"(F5). Furthermore, another woman said, "*I'm now a respected person in society because now I have a Hamba, which is a vehicle*"(F5). Moreover, one woman adds to the statement by saying "*So since I started to drive the Hamba the arguments with my husband are few. It has actually brought more affection to my husband. Because we are now sharing responsibilities and my husband sees the worth of me*"(F5).

Increased livelihood

Furthermore, many women witness that their livelihood has increased by using the Hamba, and if they did not drive the Hamba anymore more crops would rot and they would generate less income, leading to them not being able to pay for school fees and similar commodities. One woman says "*As a widow, I'm using the Hamba to pay for school fees for my children. So, this means if I stop driving the Hamba, my kids would just stay at home and they wouldn't be able to go to school*"(F5). Users expressed satisfaction with using the Hamba, not just for utility but also for the enjoyment of easier transportation and the autonomy it provides (F5, F6). One male participant said, "*It improves my life. The Hamba is very good in all areas. I*

can't explain. But I say that it is good"(F6).

4.6 The case of Honde Valley

Honde Valley was the only site visited that had not yet seen the Hamba vehicles being implemented in the area. Consequently, the individuals who participated in the focus groups and who were observed had yet to experience the Hamba firsthand. Their exposure to the Hamba was limited to sightings in the nearby village of Watsomaba, informal discussions with acquaintances, and information provided by MFA.

Therefore, this chapter does not delve into what influenced women's usage or the effects of using it. Hence, it mainly focuses on what influenced the women's adoption of the Hamba. A summary of what was found to influence the adoption is presented in Table 4.6.

Adoption
• Economic benefits • Community development • Limited last-mile transport • Social influences • Increased status in society • Perceived ease of use • Support from family and community • Mobility For Africa's Interference

Table 4.6: The different themes found in Honde Valley that influenced the adoption.

4.6.1 Influences on the adoption of the Hamba

What influenced the women to adopt the Hamba in Honde Valley were *economic benefits, community development, limited last-mile transport, social influences, increased status in society, perceived ease of use, support from family and community,* and *Mobility For Africa's Interference.* These are further described and motivated below.

Economic benefits

Several women have applied for the Hamba with the expectation that it will enhance their economic situation by increasing their efficiency at work and providing new income-generating opportunities. One woman mentions "*We want to avoid dependent syndrome*"(F3). While she said it, some of the other women nodded in agreement. The women further explained that they intend to utilize the Hamba for business purposes, such as offering transportation services, which they believe will help them earn income to support their families. This anticipated increase in income is deemed crucial by the women, who view it as instrumental in achieving various goals, including covering their children's education expenses and ensuring adequate food and shelter for their families. Additionally, they express their intent to use the Hamba as a long-term tool that will continually provide value over time. One

woman states "*I believe that the Hamba will help me excel in self-development by helping me expand to other projects. For example having different types of chickens. some for eggs and some for meats*"(F3).

Community development

While money is cited as a primary motivator for applying for the Hamba, many women perceive its benefits to extend beyond financial gain. One woman explained "*In my opinion, I see that it is something that will change the lifestyle of the community and also the household in terms of income. It is something that is going to assist the community with transportation and social impacts. Especially by transporting people. It is going to reduce the cases of gender-based values - like male abusing their women. It is going to reduce these cases*"(F3).

The women also mentioned that they viewed adopting the Hamba as an opportunity to contribute to their communities by assisting those in need. Anticipated benefits include the Hamba's potential to foster the overall development of their communities. They discuss how it could improve transportation, facilitate access to vital services like healthcare and education, and mitigate social issues such as gender-based violence. One woman say "*In my opinion I see that it is something that will change the lifestyle of the community and also the household in terms of income. It is something that is going to assist the community on transportation and the social impacts. Especially by transporting people. It is going to reduce the cases of gender based values, like male abusing their women. It is going to reduce these cases*"(F3).

Additionally, the women express a desire to contribute to their communities by using the Hamba to transport people, assist the elderly, and support children who are orphaned or in a disadvantaged situation. One woman explained "*Around the community, there are children who do not have parents and some are underprivileged. With the help of the Hamba, we will be able to at least assist them with food and maybe also some clothes. We will be able to help others in the community*"(F3) and another woman followed "*I will be able to pay school fees for my children, and they will raise up going to school wherever they want. I will be able to support the family with food, good work, and a good job. I will be able to get shelter after getting money from running my business using this Hamba. I will be able to support my mother, even my brothers*"(F3)

Limited last-mile transport

Many women believed that the Hamba would have a positive impact on their surroundings by providing mobility, influencing their decision to adopt the technology. The women noted how the Hamba addresses infrastructural challenges by providing transportation to remote areas inaccessible by cars. One woman says "*Immediately, when I just heard about it, I just thought of the last mile mobility, and the way we are surviving here, I really, really need the Hamba*" (F3).

Social influences

The women explained that social factors played an important role in their under-

standing of the Hamba. This is as they first got contact with the Hamba by seeing it at different places, talking to other women using it, or getting information from MFA. One woman explained "*I have a friend who joined from Watsomba, so I got the information. We just saw the Hamba in Watsomba, so we asked some women who were using those, and they explained to us, and that's when we decided to apply*"(F3). Another woman continued "*We heard from the village, who told us that there's something which is coming for women's development"*(F3).

Increased status in society

Further, the women explained how an expected social change is an important aspect of why they decided to apply for the Hamba. The women expressed a strong belief in the transformative potential of the Hamba regarding their social status. One woman said, "*At first, we hesitated, but then, I just think that it is something that is going to uplift us, as women*"(F3). Another woman explained that they have a desire to improve from "*zero to hero*"(F3). They further expressed the belief that the Hamba will empower them and enable them to achieve success, reach a higher societal status, and serve as role models within their communities. One woman explained her interest in the Hamba by saying "*It is something that we love since it's something that is empowering women, most of the vehicles are being driven by men*"(F3). Many women shared smiles and laughter while looking around, seeking validation from other women who also shared their thoughts. The women further explained that they anticipate significant positive changes in their lives as a result of using this technology and how they together will help each other to excel. One woman says "*Hamba is going to help us share ideas as we will be a group of women. It is something that is going to help us and build us*" (F3).

Perceived ease of use

The women note that their interest in the Hamba has grown as they have become more informed about the technology. They have received direct information about the Hamba from MFA and through word-of-mouth from other women who have used the Hamba in places like Watsomba. They explain how observing other women driving the Hamba has given them the confidence to apply for the Hamba themselves, with the mindset of "*If she can, why wouldn't I be able to*" (F3). However, the women expressed concerns about meeting the demands and monthly costs associated with the Hamba. Nevertheless, they mentioned that they do believe it is worth taking the risk. One woman said, "*Just go and try, it's all about trying and trying and trying*" (F3). Further, the women highlighted that the Hamba offers an accessible transportation solution, particularly for women in the community who may face barriers to accessing traditional vehicles that require both an initial investment and a driver's license.

Support from family and community

Some women mentioned receiving support from their families, particularly from their husbands, in their decision-making process regarding the Hamba. However, others noted a lack of support and believed that the Hamba itself could help them earn respect in the household, by contributing to the family's income. One woman

mentioned, "*My husband may respect me more if I can acquire the Hamba*" (F3). Another one said, "*The Hamba would enable me to help my husband, making both me and my husband happier*" (F3). Additionally, the women highlighted the fact that they are pursuing this opportunity together as a group. They do not view each other as competitors but rather as mutual supporters, aiming to assist each other and contribute positively to society. While the women acknowledge the existence of negative social influences, such as jealousy and skepticism from some members of their community and family, they also emphasize that people always will be skeptical.

Mobility For Africa's Interference

The women emphasized the significance of Mobility For Africa's approach to engaging with the community, highlighting it as a key factor in their willingness to explore the technology. One woman said, "*the way they were calling us, like, personal, it showed that they are very serious*"(F5). They noted that many NGOs have approached their community with promises of assistance in development efforts. However, they express disappointment in the outcomes, often being left with resources or infrastructure that they are unsure how to utilize or maintain sustainably. One woman said, "*We are used to so many governments coming around in this community and then just going away and then nothing comes*" (F3). In contrast, the women commended MFA by saying "*And the way you were calling us, like, personal, it showed that you guys are very serious* (F5). This has made them believe that MFA is a serious actor which has fostered trust and confidence in the sustainability of their product and the fact that they will not lie or leave them. This personalized approach has reassured the women that MFA's initiatives will be implemented in a manner beneficial to the community.

5

Factors influencing adoption and usage and the effects in society

In this chapter, the research questions will be answered. Initially, the first research question, *What factors are influencing the adoption and usage of electrical tricycles for women in Zimbabwe*, will be answered. This will be made through the presentation of the different factors found. Subsequently, the second research question, *How are these factors influencing the adoption and usage of electrical tricycles for women in Zimbabwe*, will be answered. This section will provide a deeper discussion regarding the dimensions found for the different factors and how strong the influences are on the adoption and usage. Lastly, the third research question, *What effects for the women and the society can be seen from the implementation of the electric tricycles*, will be answered.

5.1 Factors influencing the adoption and usage of electrical tricycles for women in Zimbabwe

Based on the mapping of the different sites, all UTAUT2 constructs, presented in chapter 2, were found to be factors influencing the adoption of electric tricycles among rural women in Zimbabwe. Furthermore, some of these UTAUT2 constructs were found to be factors influencing the usage of electric tricycles as well. Hence, these UTAUT2 constructs will from now on be called factors in the report. Furthermore, knowledge and trust were identified as additional factors facilitating the adoption and usage of the Hamba. These two additional factors are described as part of the role of the technology provider and are seen to moderate and influence five of the other identified factors. Furthermore, effects in society, resulting from the usage of the Hamba, have also been identified as a factor influencing adoption and usage. The factors influencing adoption (behavioral intentions) are illustrated in Figure 5.1.

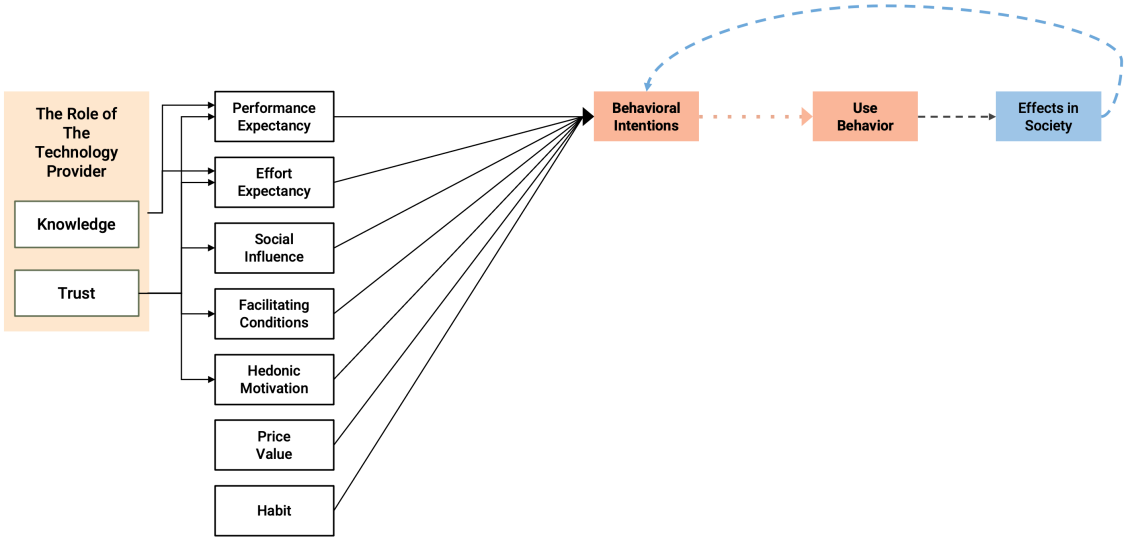

Figure 5.1: Identified factors influencing the behavioral intentions (adoption) of electric tricycles by women in rural areas in Zimbabwe.

Regarding usage, the cases exhibit that the intention to adopt (behavioral intention) significantly influences the usage of the Hamba (use behavior). However, the four factors — social influence, facilitating conditions, hedonic motivation, and habit — in combination with knowledge and trust have also been observed to be factors influencing usage. Additionally, effects in society stemming from the use of the Hamba also influence the actual usage. This actual usage has in turn also been observed to have a dynamic relationship with habit, as they mutually influence each other. The influence of the factors on the usage is illustrated in Figure 5.2.

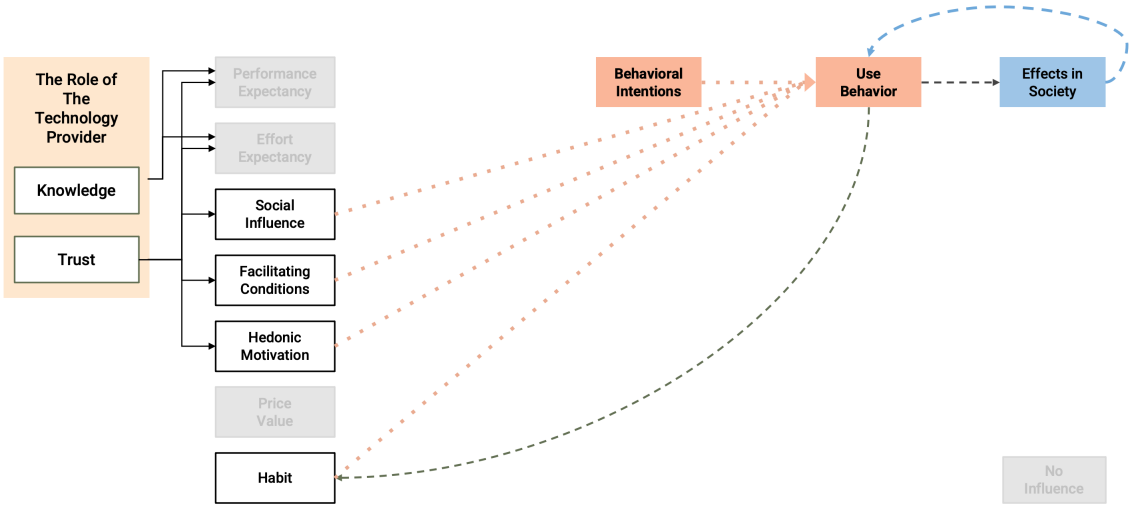

Figure 5.2: Identified factors influencing the use behavior (usage) of electric tricycles by women in rural areas in Zimbabwe.

To conclude, the factors that were shown to influence the rural women's intention to adopt the electric tricycles, the Hamba, were all the UTAUT2 constructs, knowledge, trust, and effects in society. Moreover, the factors that were shown to influence how the rural women used the Hamba were behavioral intentions (adoption behavior), social influence, facilitating conditions, hedonic motivation, habit, knowledge, trust, and effects on society. This is further illustrated in Figure 5.3.

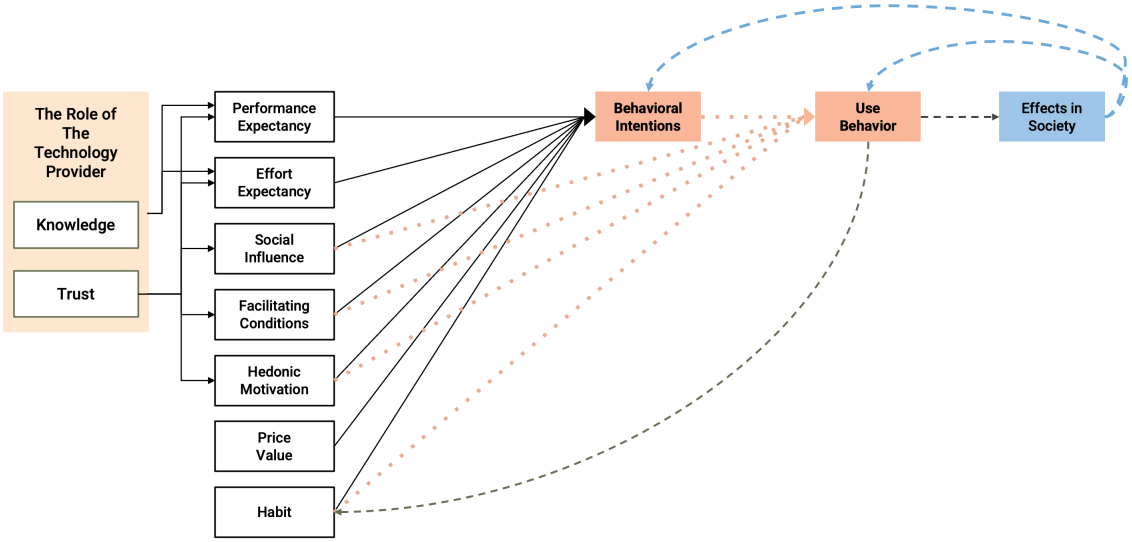

Figure 5.3: The identified factors and their influence on both the behavioral intentions (adoption) and use behavior (usage) of electric tricycles by women in rural areas in Zimbabwe.

5.2 How the found factors influence the adoption and usage of electrical tricycles for women in Zimbabwe

The influence of the identified factors on adoption and usage was further found to vary both in how and to what extent they were influencing the adoption and usage. Figure 5.4 and Figure 5.5 show the different identified strengths of influence that performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value, and habit had on the adoption respectively usage, in combination with the newly added factors, knowledge, trust, and effects in society.

Each factor, and how it influenced adoption and usage are further described in detail in the following sections and summarized in Table 5.1.

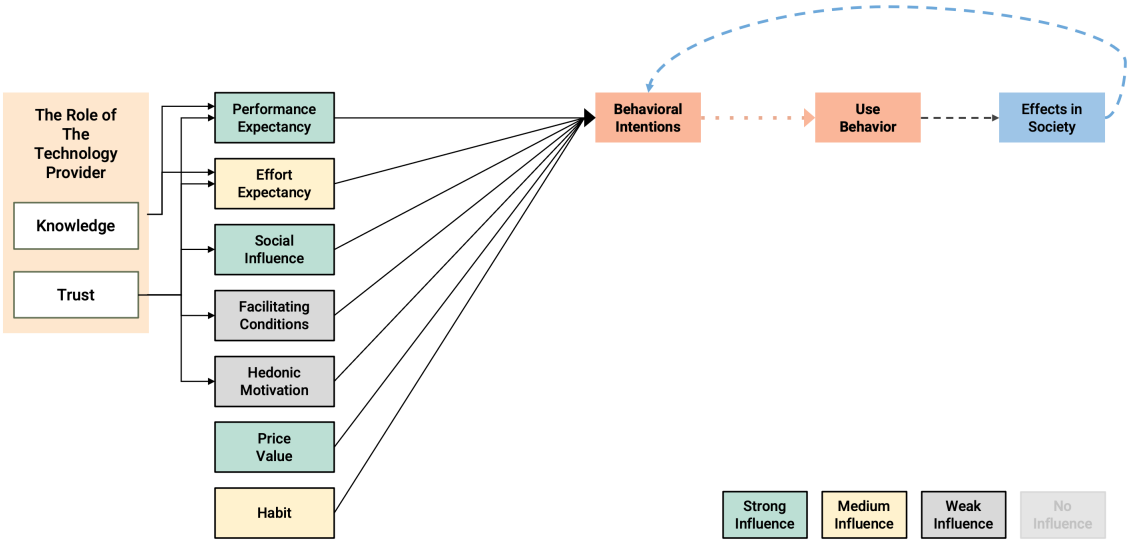

Figure 5.4: The identified strength of the seven of the identified factors that influence behavioral intentions (adoption) of electric tricycles by women in rural areas in Zimbabwe.

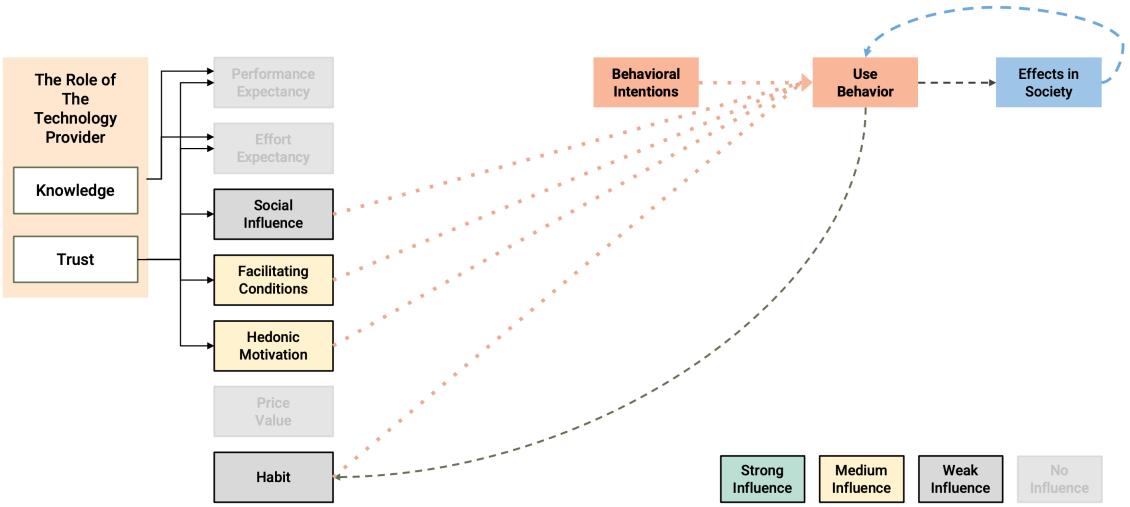

Figure 5.5: The identified strength of four of the identified factors that influence the use behavior (usage) of electric tricycles by women in rural areas in Zimbabwe.

Factor	Degree of Influence on adoption	How the factor is impacting adoption	Degree of Influence on usage	How the factor is impacting usage
Performance Expectancy	Strong	• Expected increased efficiency in economic and household activities • Expected cost-effectiveness • Expected last-mile mobility • Expected independence • Potential to generate income • Expected increased social status • Expected potential to enhance livelihood in the community with transportation • Expected physical relief • Potential to enhance livelihood in the community	*No influence*	*No dimensions found*
Effort Expectancy	Medium	• Perceived ease of use • Perceived as gender-friendly • Fear of failing recurrent expenses • Perceived low financial risks	*No influence*	*No dimensions found*
Social Influence	Strong	• Initial role of MFA • Consultation with family and community • Observing other women using the technology	Weak	• Increase in social status
Facilitating Conditions	Weak	• Proximity of MFA	Medium	• Adaptation of Routes • Technical support and infrastructure
Hedonic Motivation	Weak	• Empowerment	Medium	• Sense of pride • Enjoyment and satisfaction
Habit	Medium	• Limited mobility Experience • Inadequate past transport • Openness to change • Compatibility with existing business	Weak	• Integration into everyday life
Price Value	Strong	• The lease-to-purchase model • Expected economic benefits • Cost-effective alternative	*No influence*	*No dimensions found*

Table 5.1: A summary of each original UTAUT2 construct, now presented as factors, together with how and how much they influence the adoption and usage.

5.2.1 Performance expectancy

The expected benefits from using the technology (performance expectancy) have been identified as a factor that has a strong influence on the adoption of electric tricycles by rural women, while it is shown not to influence usage. How the influence of performance expectancy has influenced the women's intention to adopt the Hamba is described through the following dimensions, which are also shown in Table 5.1.

- **Expected increased efficiency in economic and household activities:** The Hamba is highlighted by women as a tool that enhances the efficiency of both economic and household tasks, making them easier and more manageable. It is expected to boost economic activities and facilitate more efficient household management.

- **Expected cost-effectiveness:** The Hamba is perceived as a more affordable alternative to other transportation options, making it a financially viable choice for women in these areas.

- **Expected last-mile mobility:** Women noted that the design of the Hamba allows it to navigate narrow and hard-to-reach places. Many emphasized that poor last-mile roads hinder other vehicles from accessing homes and farms. Given the long distances between farms, growth points, schools, health clinics, and other locations, the need for last-mile mobility is high, and the women mentioned a desire for the Hamba to address this issue.

- **Expected independence:** Women expected the Hamba to offer flexibility in transportation, allowing them to move around independently, transport goods, and navigate various terrains without relying on others. This would lead to increased independence.

- **Potential to generate income:** Women without significant income-generating activities viewed the Hamba as an opportunity to generate household income, improving their financial situation. With limited mobility options and high demand, many believed they could earn money by providing transportation services.

- **Expected increased social status:** Adopting the Hamba was discovered to often be associated with an anticipated rise in social status and the women gaining greater respect from their husbands, which further motivated adoption. Women emphasized gaining more friends, higher respect, and increased interest from others since using the Hamba. They even began wearing the helmet more visibly, as it is strongly associated with the Hamba

- **Expected physical relief:** For some, the Hamba was seen as a means to alleviate the physical burden of walking long distances and carrying heavy loads, thereby improving their physical well-being.

- **Potential to enhance livelihood in the community:** Many women expected that the Hamba would not only help them financially but also enable them to contribute to their community. They mentioned concerns about children having to walk long distances to school and the elderly or sick being unable to reach hospitals, seeing the Hamba as a solution to these problems.

The findings from the mapping of the sites indicate that women at all sites, independent of their prerequisites, strongly believed that the Hamba would bring significant value to both society and themselves. Those who had adopted the Hamba believed it would increase their profits. The women who already had a well-established business in their community and wanted to adopt the Hamba, in turn, believed the Hamba would enhance the efficiency of their current activities, viewing it as a tool that could seamlessly integrate into existing workflows and improve overall productivity. Conversely, women without significant income-generating activities saw the Hamba as a catalyst for starting income-generating businesses. Thus, the extent to which an individual believes that technology will yield benefits when performing certain activities appears to be a crucial factor for women in their decision to apply for the Hamba. The various dimensions indicate that women anticipate several benefits from using the Hamba, which often becomes the determining factor in their final decision. Due to this, the performance expectancy is seen to have a strong influence on the adoption.

5.2.2 Effort expectancy

The believed ease of use (effort expectancy) has been identified as a factor having a medium influence on the adoption of electric tricycles by rural women, while it is shown to not influence usage. How the influence of effort expectancy has influenced women's intention to adopt the Hamba is described through the following dimensions, which are also shown in Table 5.1.

- **Perceived ease of use:** The technology was generally regarded as easy to understand, and its complexity did not deter the women. They found the Hamba relatively easy to use in their daily activities and did not anticipate difficulties in implementation. Instead of focusing on the technical workings, many women appreciated its potential and focused on what they could achieve with it. There was no mention of fear in maneuvering the Hamba, indicating a strong perception of ease of use.

- **Perceived as gender friendly:** Some women mentioned that the design of the Hamba made them more comfortable using it. Combined with MFA's promotion of the Hamba for women, this led them to see it as gender-friendly and less intimidating compared to other vehicles.

- **Fear of failing recurrent expenses:** Although technical aspects were not a major concern, some women expressed initial fears about meeting targets and not affording mandatory battery swaps and other recurrent expenses. This

concern made them hesitant, as they were unsure if they could use the Hamba effectively enough to generate the expected income.

- **Perceived low financial risks:** Despite concerns about monthly fees, many women appreciated the absence of a significant capital requirement, viewing it as a reduction in the financial risks associated with adopting the technology.

From a technical standpoint, most women did not express significant concerns about using the Hamba. Instead, they found the technology relatively easy to use, likely influenced by support from MFA and local technicians. Furthermore, despite many women having limited experience with other vehicles and modes of transport, they were generally willing to adopt the Hamba. However, some women expressed hesitation due to concerns about the affordability of battery swaps or the possibility of not passing the final application interview. Therefore, effort expectancy is observed to have a moderate influence on the adoption of electric tricycles in rural areas. While it becomes evident that it is a significant factor impacting the decision to adopt, it is not the sole determining factor.

5.2.3 Social influence

Social influence has been identified as a factor having a high influence on the adoption of electric tricycles by rural women, while it also influences usage to a low extent. How the influence of social influence has influenced the women's intention to adopt and use the Hamba is described through the following dimensions, which are also shown in Table 5.1.

More specifically, the following dimensions were identified as part of social influence to influence the adoption:

- **Initial role of MFA:** Both observations and discussions with the women reveal that MFA played a pivotal initial role in fostering a positive perception of the Hamba. Serving as a role model for the community, MFA empowered women by encouraging them to embrace the Hamba. Consequently, MFA became a trusted and influential entity, facilitating adoption which in turn contributed to shaping how the women utilized the Hamba.

- **Consultation with family and community:** Several women mentioned consulting with family and community members when considering the adoption of the Hamba. However, societal disapproval held little sway when women strongly believed in the benefits of the Hamba, especially with support from influential individuals. Notably, this consultation appeared more significant among female adopters, whereas male adopters seemed less inclined to seek external input before acquiring the Hamba

- **Observing other women using the technology**: Women who adopted the Hamba when it was already in use by others in the community acknowledged

the influence of initial Hamba drivers in motivating their adoption. Many women emphasized that observing women with similar backgrounds effectively operating the Hamba strongly influenced their decision to adopt it.

The following dimension was identified as part of social influence to influence the adoption:

- **Increase in social status:** The impact of social influence on usage was evident in observations and communications. Many women highlighted that owning the Hamba elevated their status within the community, further motivating them to use it frequently and incorporate Hamba-related items into their attire.

In this context, social influence is driven by community observations, the role of influential individuals, and the potential for increased social status. During the field study, it became evident that social hierarchies were well-defined and that individuals with higher status exerted a strong influence on the community. Hence, cultural and social norms, along with established social hierarchies, underscore the importance of social influence.

In addition, conversations with the women revealed a distinction between positive and negative social influence, where the positive were often stronger than the negative ones. Positive influences, such as encouragement from others to use the technology, had a significant impact on the women's decision to adopt the Hamba. Conversely, negative influences, such as others doubting their ability to obtain the Hamba, appeared to have less impact on their final adoption decision.

Moreover, social influence seems to be more important among female adopters, compared to male adopters. This became evident through the focus groups, where the male adopters barely mentioned the impact on their decision from external actors, society, and their families. Instead, most of them saw it as obvious that the technology would benefit them, and therefore no consultation was needed.

When it comes to the usage, social influences are identified to show some kind of influence on how women are using the Hamba. As using the Hamba is so strongly connected to gaining a higher social status, this influence has motivated women to use the Hamba more frequently. Therefore, social influence is considered to have a, although weak, influence on the actual usage of the Hamba.

5.2.4 Facilitating conditions

The surrounding support infrastructure (facilitating conditions) has been identified as a factor having a low influence on the adoption of electric tricycles by rural women, while it influences the usage to a medium extent. How the influence of facilitating conditions has influenced the women's intention to adopt and use the Hamba is described through the following dimensions, which are also shown in Table 5.1.

More specifically, the following dimension was identified as part of how facilitating conditions has influenced the adoption:

- **Proximity of MFA:** The proximity of MFA offers immediate support and assistance to users, thereby facilitating the adoption and usage of the Hamba. Women noted that MFA's individualized approach, addressing each woman separately rather than as a group, fostered the perception of long-term support and resource availability. Consequently, the proximity and approach of MFA positively impacted the facilitating conditions.

The following dimensions were identified as part of facilitating conditions to influence the usage:

- **Adaptation of routes:** Although brought up by a male participant, it was observed that MFA's infrastructure adjustments directly influenced technology usage. Route adaptations were made based on the placement of charging stations and battery coverage, optimizing travel. Strategically positioned charging facilities and MFA's facilitation of battery charging and swapping enhanced the practicality and usability of the Hamba, fulfilling its last-mile mobility purpose.

- **Technical support and infrastructure**: The availability of technical support and infrastructure, encompassing training and maintenance assistance, contributed to heightened knowledge and awareness of the Hamba among drivers, affecting the way they drive. Several women highlighted increased technical and traffic knowledge gained from driving the Hamba, which strongly influenced their usage patterns. They emphasized growing confidence through easy access to technical support, enabling them to address potential concerns or inquiries effectively.

Observations during the field study revealed that MFA invested significant effort in thoughtful customer acquisition, training, and support infrastructure. The observations further revealed that the support and infrastructure provided by the company have been essential for the deployment of the technology.

However, most women participants did not see facilitating conditions as an enabler for their adoption of the technology. Instead, most information regarding the influence of facilitating conditions on usage and adoption came from male participants, suggesting that it played a more significant role in their adoption and usage than it did for women. Hence, the factor facilitating conditions is considered to have a weak influence on the initial adoption.

Although the women did not seem to consider infrastructure to a large extent before adopting the Hamba, the surrounding infrastructure is shown to influence what routes are chosen. Hence it is setting some constraints on how the technology can be used. Furthermore, the training and local support has generated knowledge for

the women on how to drive. Due to this, the facilitating conditions are considered to have a medium influence on the usage.

5.2.5 Hedonic motivation

The fun or pleasure derived from the technology (hedonic motivation) has been identified as a factor having a weak influence on the adoption and a medium influence on the usage of electric tricycles by rural women. How the influence of hedonic motivation has influenced the women's intention to adopt and use the Hamba is described through the following dimensions, which are also shown in Table 5.1.

More specifically, the following dimension was identified as part of the hedonic motivation to influence the adoption:

- **Empowerment:** Ownership of the Hamba was anticipated by the women to give control over their mobility, further empowering them within their communities. Initially apprehensive about driving the Hamba due to its unfamiliarity, women experienced a shift in perception after receiving guidance and assurance from MFA, leading to feelings of excitement and empowerment. This change significantly contributed to their willingness to adopt the Hamba, underscoring the motivational aspect of excitement and empowerment.

The following dimensions were identified as part of hedonic motivation to influence the usage:

- **Sense of pride:** Observations and discussions revealed that the Hamba instills a sense of pride among women, fostering a feeling of belonging and pride that reinforces the hedonic motivation associated with its use. This pride influences how women choose to utilize the Hamba, including where they park and which routes they select.

- **Enjoyment and satisfaction**: The enjoyment and satisfaction derived from using the Hamba were key factors driving its continued usage. Women expressed pleasure in the convenience and efficiency offered by the Hamba, motivating them to continue its use. Several women who had never driven before found it enjoyable, contributing to the frequent use of the Hamba.

As mentioned above, excitement has the potential to influence one's intention to use a specific technology. However, the collected data indicate that the influence of hedonic motivation is relatively weak. Discussions with the women reveal that when resources are limited, the enjoyment derived from using a specific technology is not sufficient motivation for adoption. This is further strengthened by the fact that before adopting the Hamba, the women had a limited understanding of the technology, how it operated, and the potential enjoyment it could bring. Hence, a potential enjoyment was not even considered in the adoption.

Nevertheless, once both men and women adopted the Hamba, the significance of hedonic motivation became more evident. They discovered that using the Hamba could be enjoyable and beneficial in various ways. This newfound understanding led them to explore different uses of the Hamba, resulting in similar income levels but varying degrees of enjoyment. Consequently, they realized that they could derive satisfaction and pleasure from their work. Driving the Hamba brought them joy, boosted their self-confidence, and enhanced their social status.

5.2.6 Habit

Habit has been identified as a factor having a medium influence on the adoption and a low influence on the usage of electric tricycles by rural women. How the influence of habit has influenced the women's intention to adopt and use the Hamba is described through the following dimensions, which are also shown in Table 5.1.

More specifically, the following dimensions were identified as part of habit to influence the adoption:

- **Limited mobility experience:** The participating women had minimal experience in driving or using similar technology for flexible mobility, resulting in a lack of established habits for convenient, enjoyable, and flexible transportation.

- **Inadequate past transport:** Several women recounted their experiences with inadequate transportation options that failed to fully meet their needs. The Hamba, with its capabilities, addressed this gap, prompting an adaptation of their previous habits to the new, better-suited routines facilitated by the Hamba.

- **Openness to change:** Due to the absence of reliable transportation in their previous habits, the women demonstrated an openness to trying new approaches and modifying existing activities to accommodate the technology. Rather than expecting the technology to conform to their existing lifestyle, they embraced change to align with the technology, contributing to their willingness to adopt and integrate the Hamba into their daily routines.

- **Compatibility with existing business:** Some women anticipated the Hamba seamlessly integrating into their daily operations, enhancing efficiency while fitting into their existing habits. Particularly for those traveling long distances, the Hamba was viewed as easily assimilated into their current routines. Conversely, individuals with entrenched habits centered around profitable economic activities exhibited some resistance, as they did not perceive the need to integrate the Hamba into their functioning. Despite recognizing the societal value of the technology, their strong individual habits caused hesitation in adopting it.

The following dimension was identified as part of habit to influence the usage:

- **Integration into everyday life:** Women who adopted the Hamba described how it gradually became more integrated into their lives with daily use. They developed strong habits around using the Hamba, underscoring its importance and utility. Many expressed an inability to envision their lives without it. As a result of acquiring the Hamba, some women modified their businesses to align better with its capabilities, while others explored new income-generating opportunities facilitated by the technology.

Initially, few women had prior experience in driving or using similar technology for flexible mobility, thus there were no existing habits to change. Adopting the technology proved more challenging for some women with established businesses and ingrained habits compared to those without such habits. However, the majority of women remained receptive to the Hamba, actively evaluating their habits and their potential relationship with the technology before deciding to apply or not. However, there are many indications that the women were open to new solutions and thus when they were introduced to the Hamba and saw or heard about its effects in nearby communities, they were open to changing their habits. In other words, habits did influence the initial attitude towards the technology, although it was not decisive.

Once adopted, these individuals easily integrated the Hamba into their daily lives, considering it an indispensable part of their routines. This habitual use of the Hamba further reinforced their intention to continue using it in the future. Initially, they were open to changing activities when adopting the Hamba. With continued usage, they developed strong habits, and the Hamba became deeply integrated into their lives, significantly improving their quality of life.

Therefore, the habits of the women could also be seen to influence the actual usage of the Hamba, in a different way than how it influenced the initial adoption. The reason for this was that some of the habits of the women did not become visible before actually using the Hamba. In addition, the women explained how they also could change their habits as a result of the effects of using the Hamba. Hence, the relationship between habits and usage is dynamic and is shown to change over time. This is also illustrated in Figure 5.2 by the arrow from use behavior to habit.

5.2.7 Price value

The advantages compared to the monetary expenses (price value) have been identified as a factor having a strong influence on the adoption of electric tricycles by rural women while it is shown not to influence usage. How the influence of price value has influenced the women's intention to adopt the Hamba is described through the following dimensions, which are also shown in Table 5.1.

- **The lease-to-purchase model:** A significant factor motivating women to consider the Hamba as a viable option, despite its operational costs, was the lease-to-purchase model. This arrangement enabled them to generate income before making payments, illustrating a strong dedication and belief in the product's value among adopters. Many women chose to adopt the Hamba even without certainty regarding their future earnings, underscoring their confidence in the product.

- **Expected economic benefits:** Among the various factors discussed, the anticipated economic benefits of acquiring the Hamba were deemed the most influential. However, women recognized that for the technology to be considered, these anticipated benefits needed to outweigh the potential revenues from existing businesses. While this was often the case, in some instances, it served as the primary reason for women not to adopt the Hamba.

- **Cost-effective alternative:** Both male and female participants observed the limited transportation options in their areas, often characterized by high costs. Consequently, they perceived the Hamba as a comparatively affordable alternative, despite acknowledging its associated expenses.

Observations and focus groups revealed that most women had minimal or no economic income to rely on. Despite their limited financial resources, many women were determined to apply for the Hamba. Aware of the associated costs, they nevertheless exhibited confidence in their ability to make it financially viable. This indicates that even with the risk of not being able to cover the expenses for the Hamba, most women are willing to take the risk because they recognize the potential benefits it could bring to their families and communities.

Additionally, many women demonstrated dedication and drive to develop their businesses to earn more money. This suggests that many women in these areas possess significant potential that is often overlooked. It further underscores that price value had a substantial influence on the women's decision to adopt the Hamba. Despite the potentially high operational costs, the perceived value of using the Hamba is so significant that it outweighs the necessity of immediate profit.

5.2.8 Additional factors

As outlined previously, the elements of knowledge and trust are not incorporated within the UTAUT2 framework, hence they are unique factors found by the researchers. In the specific context, these factors became apparent through MFA's role and its impact on adoption and usage patterns. In other words, the technology provider, can by applying these factors moderate the other constructs and hence effect their influence on the adoption and usage. Furthermore, effects in society were seen as a third additional factor, where it was found that the effects that occurred due to the deployment of the Hamba played a vital role in the community's acceptance of it.

Factor	Influence	How the factor is influencing
Knowledge	• Performance expectancy • Effort expectancy	• Empowerment • Critical thinking skills • Business knowledge • Driving and skill development • Technical knowledge
Trust	• Performance expectancy • Effort expectancy • Social influence • Hedonic motivation • Facilitating conditions	• Community leaders • Reliable support • Transparent communication • Physical proximity
Effects in Society	• Behavioral intentions • Use behavior	*No categories have been assigned to this factor*

Table 5.2: The additional factors identified, together with which of the other factors that they influence and how they are influencing.

5.2.8.1 Knowledge

The decision to include knowledge as a factor has been taken for the reason that in this context, knowledge seems to exert influence on both the women's believed benefits of the Hamba (performance expectancy) and their perceived ease of using it (effort expectancy). How knowledge has influenced performance expectancy and effort expectancy is further seen in the dimensions below:

- **Empowerment**: Early on and during community engagements, MFA consistently focused on educating women about equality and women's rights, persistently making sure that the women understood their value. This was crucial for the women to start building confidence in adopting and using the Hamba, despite resistance from their husbands or the community. This has further contributed to the women's belief in the benefits of using the Hamba.

- **Critical thinking skills**: By encouraging curiosity and questions about the Hamba, and creating an environment where customers could experiment with the product, many women developed critical thinking in combination with enhanced technical and social knowledge. This newfound skill could further be transmitted to other technologies and situations. This has further generated a greater understanding of technology and therefore contributed to the women's perceived ease of use.

- **Business knowledge**: As a part of the community engagements and acquisition process, Mobility for Africa also included aspects of business management, such as calculating costs, managing earnings, and exploring new business ideas. This knowledge was instrumental in helping the women see the potential value of the Hamba, and how to use the Hamba for income-generating purposes.

- **Driving and skill development**: After the adoption phase, Mobility for Africa provided comprehensive training on how to operate the Hamba, which was crucial for women who had no prior experience with such technology. The

knowledge transmitted by MFA helped the women overcome initial fears and hesitations about using the Hamba.

- **Technical knowledge**: During the usage, MFA provided continuous technical support, which ensured that the women could effectively troubleshoot and resolve issues with their Hamba. This support is critical for maintaining the functionality and reliability of the Hamba over time.

An important aspect found from the above dimension is that knowledge is not something that is only generated once, it is built over time. This is especially the case in this context, where the men and women adopting the technology have low general technical knowledge and experience. Conveying clear information about the potential value of the technology in combination with education about the technical aspects is vital at the beginning of the adoption. Moreover, ongoing support is essential, where initial knowledge is complemented with technical and operational insights, facilitating the continued use of the technology. As seen above, the ongoing knowledge achieved through local technicians was not as explicit as the initial information provided during the training. Instead, it was integrated into product usage, allowing for the gradual accumulation of expertise.

The availability and development of knowledge within the community during the use of the technology emerged as critical for its long-term sustainability. Although the women did not initially see it as crucial to fully understand the technology, it was evident from observations that this type of knowledge must be built up to ensure the technology's long-term durability and integration into the community.

5.2.8.2 Trust

Trust was included as a factor as it was found it influences the women's believed benefits of the Hamba (performance expectancy), their perceived ease and enjoyment of using it (effort expectancy and hedonic motivation), their social influence, and their perception of support available (facilitating conditions). How trust has influenced these factors is further seen in the dimension below:

- **Community leaders**: The findings underscore that MFA started building the communities' trust through community leaders and respected individuals with higher social status in these communities. MFA could not have reached its desired customers without first gaining the trust of influential individuals within the country. This is particularly important given the women's critical views of previous encounters with non-governmental organizations (NGOs). These past experiences have left them and others skeptical, leading to a cautious and critical perspective on how new technologies are introduced, often resulting in initial resistance to adoption.

- **Reliable support**: The consistent and reliable support in combination with quick responses from technicians contributed to the women building trust in MFA. Moreover, knowing that help is quickly available might have contributed

to the women feeling great trust in MFA's ability to support them in any matter. By increasing this trust, the importance of understanding everything around technology seemed to decrease while the openness to try the technology increased.

- **Transparent communication**: Open and transparent communication from MFA about the benefits, costs, and operational aspects of the Hamba helped in building trust. Furthermore, MFA made sure to keep the women well-informed about the Hamba and the commitment they were making. The trust in MFA providing them with correct information contributed to the women being more comfortable that they could rely on the company, hence MFA's social influence on the women increased.

- **Physical proximity**: Proximity facilitated the building of trust and strong relationships between the women and MFA. Being nearby allowed MFA to understand and adapt to the specific needs and challenges faced by the women in the communities. Furthermore, the women enhanced the importance of having a close relationship with the staff of MFA and highlighted the efforts made to personally call each one of them. The trust in physical proximity enabled the women to feel comfortable with adopting the technology, knowing that help is always accessible.¨

From these findings, it is evident that trust in the value of the technology is strongly linked to trust in the company. Thus, if the company successfully earns its customers' trust, communicating the technology's value may become easier or even unnecessary. This reduced performance expectancy's influence on the adoption and usage. The same principle applies to the need for customers to fully understand the technology's ease of use or the robustness of the supporting infrastructure. Customers view the support from the technology provider as sufficient and trust that the provider will assist with any potential future problems. Consequently, this trust simplifies the adoption and usage process, making these factors less vital. Furthermore, the company's transparency and approachability can significantly enhance trust. As a result, customers may view the company as an important role model, capable of motivating and empowering them.

5.2.8.3 Effects in society

As mentioned shortly in the introduction, this factor was seen to influence the acceptance and usage of the technology as the effects of it became more and more apparent. As witnessed by many of the women, earlier attempts to implement technology in their communities usually failed, which decreased the general acceptance of new technologies in the community. However, as many women in the community had seen the positive effects of the Hamba, more of them were willing to apply for and use it. Therefore, this is a factor that needs to be taken into consideration. By implementing technology in these communities, durability and long-term sustainability will be vital to create positive effects in the community and therefore increase the acceptance and usage of the technology.

5.3 The effects seen for the women and society

To answer the last question in this research, the last factor, effects in society, will be decomposed into what the women told that they had seen due to the implementation of the Hamba. Worth noting is that there might be more effects from this that the women did not tell or long-term effects that are yet to become visible. By adding this factor, this research contributes to a more in-depth explanation of the gender dynamics and societal effects that can occur when technology is accepted and adopted by women in a developing community.

To begin with, the women who adopted the Hamba witnessed several personal benefits including increased income, social status, health, and independence, which are further explained below:

- **Increased Income**: Women using the Hamba could generate more income by engaging in various economic activities, such as transporting goods and passengers.

- **Higher Social Status**: Owning and operating a Hamba elevated women's social status within their communities. Women gained respect and recognition from community members, including men, due to their newfound economic contributions and visible mobility.

- **Increased Health**: The physical burden of carrying heavy loads, such as water or firewood, was reduced, decreasing physical strain and associated health issues. The overall improvement in mobility allowed for better access to nutritious food and other health-related resources.

- **Independence**: Owning a Hamba provided women with greater autonomy, as they no longer needed to rely on others for transportation. The sense of ownership and responsibility for the Hamba boosted their confidence and self-reliance, fostering a greater sense of empowerment.

The testimonies of these women illustrate the depth of these effects. For instance, the phrase "Zero to hero" encapsulates the significant social journey many women experienced when they adopted and started using the Hamba. A social journey they made in a short time, sometimes just a few weeks. Hence, having the Hamba goes beyond merely owning their first asset; it involves gaining confidence that they had never been given and being able to contribute in ways they previously thought were impossible.

In addition to this, several general societal changes were observed as a result of women adopting the Hamba:

- **Higher school attendance**: Increased income from using the Hamba allowed women to afford school fees for their children. Furthermore, the Hamba en-

abled mothers to transport their children to school safely and reliably, ensuring regular attendance.

- **Increased livelihood in the community**: As the women were transporting the elderly to the hospital and buying groceries for those without transportation options, they strengthened the community.

- **Fewer prostitutes in the bars**: The availability of a stable income from Hamba-related activities for the women contributed to a decline in the number of women engaging in prostitution.

- **Less produce rotten in the field**: The Hamba allowed for faster and more efficient transportation of agricultural produce to markets, reducing spoilage.

- **Less women abuse in the homes**: Economic empowerment and increased respect for women who owned and operated the Hamba led to a decrease in domestic violence. Women's financial contributions to their households further increased their bargaining power and respect from their partners.

- **Shift in Societal Perceptions**: As the women use the Hamba, perceptions of what women can do change in society, leading to women's opinions being more respected and listened to.

The findings indicate that owning a Hamba is not merely about transportation; it symbolizes a significant shift in mobility and autonomy for rural women. This enhances mobility firstly allows women to engage in various economic activities, thereby improving their income and economic standing. This increased income enables women to better support their households and afford essential expenses, thus contributing to their family's financial stability. Moreover, the respect and recognition that come with improved economic contributions elevate women's social status in both the household and community, which breaks down traditional gender barriers. Secondly, it becomes evident that it has contributed to health improvements among women using the Hamba. More specifically, the enhanced mobility provided by the Hamba allows for easier access to medical facilities and reduces the physical strain associated with daily tasks, significantly improving overall well-being.

Moreover, providing women with assets like the Hamba not only fosters individual empowerment but also increases the overall level of mobility within the area, contributing to broader socio-economic benefits for the entire community. More specifically, owning an asset like the Hamba has been shown to reinforce women's sense of responsibility and self-reliance, which significantly empowers them and influences their roles within the community. The newfound autonomy further enables women to contribute effectively to their communities, and the women often emphasized the importance of assisting others when possible for example hospitals, or driving other children in need to school.

6
Discussion

The following discussion chapter delves into both the theoretical and practical implications, as well as where future research should be aimed. By exploring the implications, the aim is to bridge the gap between the observed data and the UTAUT2 framework, while also providing insights to gender theory and practitioners in the field. This could also offer valuable guidance for stakeholders aiming to implement or support similar technologies effectively.

6.1 Theoretical Implications

In this chapter, the findings will be analyzed and compared to the existing UTAUT2 literature. The analysis will provide a comprehensive discussion of how the research's findings align with, and contribute to, the UTAUT2 framework in a developing context. Subsequently, the study's contribution to and alignment with gender theory will be discussed.

6.1.1 Contributions to the UTAUT2 theory

In this section, the insights gained about the seven constructs, so-called UTAUT2 factors in this report, of Venkatesh et al. (2012) will be discussed. As a qualitative study, this research has explored the nuances of technology adoption, particularly in rural areas and among women. By delving into this specific context, the study provides a deeper understanding of how the UTAUT2 factors influence the adoption and usage of technology in developing regions. This contribution adds significant depth to the existing literature on technology acceptance in these settings. Subsequently, the section will discuss the added role of the technology provider, which includes two new factors, namely trust, and knowledge, which affect the adoption and usage.

6.1.1.1 The seven constructs of Venkatesh and how they influence the adoption and usage of technology in rural areas

This part of the theoretical implications compares the findings to the existing literature on the seven UTAUT2 factors introduced by (Venkatesh et al., 2012), assessing their relevance and applicability in the context of technology adoption and usage in rural areas.

Performance expectancy

The influence of performance expectancy on rural women's decisions to adopt the Hamba is consistent with the UTAUT2 framework introduced by Venkatesh et al. (2012), as performance expectancy is shown to play a critical role in the adoption decision. This becomes evident, as the women all emphasized how the perceived benefits from using the Hamba were believed to be so extensive that they were willing to go against other strong influences opposing adoption.

This assertion is supported by both the research made by Apfel and Herbes (2021), Addy et al. (2023) and Gharaibeh et al. (2018) which all identified performance expectations as a key factor in technology adoption in a developing context. For instance, Apfel and Herbes (2021) concluded that beliefs in decreased costs and enhanced business operations positively influenced the adoption. Similarly, research by Addy et al. (2023) and Gharaibeh et al. (2018) found that participants' belief in the technology's ability to enhance efficiency and productivity drove the incentives to adopt the technology. In addition, Dutta and Shivani (2020) specifically focused on women, concluding that the belief in the technology's potential to improve business growth, efficiency, and productivity strongly influenced their intention to adopt. Together with this, the findings of these studies suggest that regardless of the context or the specific technology being introduced, the belief in gaining benefits from using the technology remains a crucial factor in the adoption process. This consistent pattern across various studies underscores the importance of performance expectancy in driving technology adoption among women in rural areas. However, in contrast to previous studies in the developing context like Apfel and Herbes (2021), Gharaibeh et al. (2018) and Dutta and Shivani (2020), the women in this study did not only mention hard benefits like the expected increase in productivity and enhanced business operations. Instead, many women also focused on softer benefits, like increased independence and increased social status. Indicating that soft benefits could be as important for the intention to adopt a technology among the women.

When examining how performance expectancy has influenced the actual usage of the Hamba, it appears that women placed limited emphasis on this factor after adopting the electric tricycle. This suggests that while the expected benefits from using the technology are crucial during the initial adoption phase, its importance diminishes as users become accustomed to the technology. This observation aligns with Venkatesh et al. (2012), as well as earlier studies investigating UTAUT2 in a developing context (Apfel and Herbes, 2021; Gharaibeh et al., 2018; Addy et al., 2023; Manrai et al., 2021; Dutta and Shivani, 2020). The shift in influence likely occurs because performance expectancy revolves around an individual's belief in the technology's benefits, which are realized once they begin using it.

Effort expectancy

Similar to Venkatesh et al. (2003) the findings suggest that effort expectancy only influences the adoption, and not the usage. However, effort expectancy only had a medium influence on the decision to adopt the Hamba. This may be attributed to findings from the study conducted by Apfel and Herbes (2021) on the UTAUT2

framework in Senegal. The authors state that there is a risk that many participants lacked sufficient knowledge of the technology to anticipate potential challenges before they started using it, hence the technology was perceived as quite easy to use. A lack of prior knowledge of other advanced technologies may, therefore, lead individuals to underestimate the ease of use of the technology.

Moreover, compulsory training and close support from MFA were likely to play a crucial role in reducing the influence of effort expectancy and enhancing the perceived ease of use of the Hamba. This type of support is also emphasized in Dutta and Shivani (2020) and Manrai et al. (2021) studies on women's technology acceptance. These researchers highlight the need to enhance perceived value and ease of use by creating an enabling environment that supports technology use through proper infrastructure, training, and mentorship programs. Therefore, when advanced technology is introduced in a developmental context, these surrounding support systems become even more critical.

The findings further emphasize that effort expectancy is not always directly related to using the specific technology. Instead, it can also be linked to concerns regarding the payment or acquisition process, essentially the business model through which the technology is provided, and how easy customers expect this process to be. In this context, where the target customers were women with low incomes, it became evident that concerns about payment were more significant than concerns about the actual ease of use of the technology. Their primary concern was the ease of meeting their expectations for the technology, specifically that it should enable them to earn more money than before. This suggests that in the UTAUT2 framework, the perceived ease of use is not only connected to the use of the technology but also to the acquisition process.

Social Influence

In this research, social influence significantly impacted both the adoption and usage of the Hamba among women, contrary to Venkatesh et al. (2012) findings, which suggest that social influence only affects the initial adoption phase. More specifically, this research reveals that social influence extends beyond initial adoption and continues to play a crucial role in how technology is used over time. This ongoing influence suggests that the opinions and behaviors of peers, family members, and community leaders not only encourage women to adopt the Hamba, which is something that both Gharaibeh et al. (2018), Manrai et al. (2021) and Dutta and Shivani (2020) emphasize, but also shape their patterns of usage. For instance, seeing others successfully use the Hamba can reinforce its perceived value and encourage similar usage behaviors among new adopters.

Furthermore, the study introduces a distinction between positive and negative social influences. Positive social influences include supportive behaviors and attitudes from others, such as encouragement and successful role models, which can enhance confidence and motivation to use the technology. Negative social influences, on the other hand, encompass discouraging behaviors or skepticism about the technology's

value or feasibility. Interestingly, the findings suggest that when positive social influences are present and strong, they can mitigate or even neutralize the impact of negative social influences. This distinction between positive and negative social influences, and their combined effect, is not explicitly addressed in Venkatesh et al. (2012) findings or other existing literature.

In addition, this research highlights the heightened significance of social influence in driving technology adoption among female adopters, a finding consistent with Venkatesh et al. (2012) observations regarding gender differences in decision-making processes. Women, as suggested by Venkatesh et al. (2012), often exhibit more interdependent and cooperative decision-making tendencies compared to men, leading them to consider a broader spectrum of factors in their adoption decisions. Contrary to Apfel and Herbes (2021), which may not have adequately represented women participants, the findings underscore that although individual values matter, social influences play a vital role, particularly among female adopters.

Furthermore, the study finds that social influence in a developing context is also strongly connected to influence in the community and among certain authorities. This has further been mentioned in studies like Dutta and Shivani (2020), Gharaibeh et al. (2018) and Addy et al. (2023), which indicates the importance of taking these social influences into account in developing contexts.

Facilitating Conditions

According to Venkatesh et al. (2012), women often prioritize the availability of resources, knowledge, and support when accepting new technology. Furthermore, previous studies investigating UTAUT2 in a developing context show that support and rigid infrastructure strongly influence the incentive to adopt a technology (Gharaibeh et al., 2018; Manrai et al., 2021; Dutta and Shivani, 2020). Therefore, it was initially hypothesized that facilitating conditions would strongly influence Hamba adoption. However, the women rarely mentioned the support infrastructure when discussing their motivations to adopt the technology. Hence, this is indicating its low influence on adoption in this case.

However, in discussions with women who used the Hamba, there was a growing emphasis on the importance of supporting systems, indicating an increasing awareness of how these systems influence their usage. This finding resonates with Venkatesh et al. (2012), who states that facilitating conditions also impact usage.

In particular, these insights reinforce the view that facilitating conditions are not necessary for a customer to adopt the technology, but they are necessary to achieve better use of the technology. Although some of the participants said they encountered challenges related to the current infrastructure and support, none of the participants mentioned that they would stop using the technology. Instead, they were willing to contribute insights on how it could be improved. This suggests that people are more willing to tolerate inadequate support systems if they see significant benefits from the technology and believe that these systems will improve over time.

Hedonic Motivation

In this study, hedonic motivation exhibits minimal influence during the adoption phase of electric tricycles, whereas its impact becomes more pronounced during usage. This finding contrasts with Venkatesh et al. (2012) assertion that hedonic motivation plays a role in both adoption and usage. Nonetheless, the framework also suggests that limited experience can moderate hedonic motivation and contribute to heightened interest in technology use. Venkatesh et al. (2012) argue that consumers are initially attracted to the novelty of the technology, but as their experience with it increases, practical considerations gain prominence, leading to a decrease in the influence of hedonic motivation.

This study, however, underscores that hedonic motivation may not be a primary consideration during technology adoption, especially when experience is limited. The women participants in this research did not explicitly express being drawn to the novelty or fun aspect of the technology; instead, they primarily focused on its potential to improve their lives. This may be attributed to their limited experience with various technologies, leading them to view the technology itself as less of a solution to their problems. This aligns with earlier UTAUT2 research within the developing contexts, where the overall conclusion is that other aspects such as the functional benefits and ease of use outweigh the importance of enjoyment or pleasure derived from a technology (Addy et al., 2023; Gharaibeh et al., 2018; Manrai et al., 2021; Dutta and Shivani, 2020).

However, the study found that as experience with the specific technology grows, hedonic motivation increases, as the customer realizes that enjoyment and utility can be mutually reinforcing. This indicates, that in a developing context, hedonic motivation has little, or no influence on the incentive to adopt a technology. However, as experience grows, this factor can affect the way an individual uses the technology.

Price Value

This study found that price value had a significant influence on the women's decision to adopt the Hamba, which aligns with both Venkatesh et al. (2012), Dutta and Shivani (2020) and Apfel and Herbes (2021) findings about price value. Despite the perceived high cost associated with owning the Hamba, many participants in the study expressed a strong interest in acquiring it. While the price-value consideration was influenced by the believed benefits of acquiring the Hamba, participants appeared to take a holistic approach to their purchase decision-making, weighing various factors.

Contrary to the assertion by Venkatesh et al. (2012) that women are more price-sensitive than men, the findings suggest that in this context, women were not solely driven by price considerations when deciding to adopt the Hamba. Some women even opted for the Hamba despite not immediately benefiting financially, highlighting the significance of perceived value over immediate returns. This nuanced understanding suggests that while price remains a consideration, its importance diminishes in the presence of a high perceived value.

One reason for this difference could lie in the alignment between the perceived benefits of using the Hamba and women's spending patterns. According to Women's World Banking (2023), women typically prioritize expenses that improve their families' well-being, with significant allocations towards education, healthcare, and housing. This parallels the expectations of the women in this study regarding the Hamba's potential contributions, such as increased household income and the ability to cover their children's school fees.

Consequently, the positive impact on women's spending behavior, combined with their limited access to work and education due to prevailing gender norms, led them to accept the technology despite economic concerns. This further underscores the importance of considering a broader value proposition than solely price when providing women with technology in this context.

Habit

Habit, observed in this study, appears to have a moderate influence on the adoption and a weaker impact on usage when it comes to the Hamba. This finding reflects Venkatesh et al. (2012) insights, which suggest that habit plays a role in both the decision to adopt and the continued use of technology.

However, findings from this research diverge from Venkatesh et al. (2012), indicating that habit is not fixed but rather adaptable, hence subject to change during the adoption and usage processes. This adaptability of habit becomes evident, particularly when a technology, such as the Hamba, promises significant performance benefits that require adjustments in users' routines. The women in this context demonstrated a willingness to modify their habits to optimize the utility of the technology. This suggests that habit is not only influenced by existing behaviors but can also be shaped by the perceived benefits and requirements of the technology being adopted. However, similar to Addy et al. (2023) and Manrai et al. (2021), the findings show that depending if the earlier existing habit aligns with the new routines or not, will indicate if it has a positive or negative influence on the adoption.

Furthermore, unlike Venkatesh et al. (2012) findings, which portray habit as a static factor, this study reveals a dynamic interplay between habit formation and usage. While habits traditionally influence behavioral patterns, the findings suggest that usage can also influence, and even reshape, existing habits over time.

In addition, Venkatesh et al. (2012) observation that individuals with limited experience tend to be more attentive to their surroundings and adaptable in their decision-making processes aligns with the findings of this study. More specifically this study helps to strengthen the fact that in contexts where individuals lack familiarity with a particular technology, they are more inclined to observe and respond to contextual cues, allowing for greater flexibility in habit formation and adjustment.

6.1.1.2 Additional factors added to the framework: The role of the technology provider and effects in society

Since knowledge and trust are not included in Venkatesh et al. (2012) UTAUT2 framework, the discovery that these factors contribute to the adoption and usage of the Hamba among women in Zimbabwe represents a direct contribution to the UTAUT2 theory. Furthermore, these findings are particularly relevant for UTAUT2 theory within a development context.

Even if not explored by Venkatesh et al. (2012), prior research has explored these elements, particularly within the framework of a developing context. How each of the added factors contributes to the UTAUT2 research will be presented below.

Knowledge

Drawing from previous studies, such as the work of Apfel and Herbes (2021) on technology acceptance of Renewable Energy Technologies in Senegal, knowledge emerges as a critical factor to the extended UTAUT2 version. Apfel and Herbes (2021) mentions that they define knowledge similarly to Rogers' Diffusion of Innovation theory, which is that knowledge encompasses awareness of the technology and the individual's interpretation of information, including how to use the technology and its underlying principles. This understanding aligns with Rogers' assertion that knowledge is a crucial step in the innovation-diffusion process, a viewpoint also supported by Apfel and Herbes (2021).

In this study, this understanding of knowledge was compared with its influence on women's decision-making processes regarding the adoption and use of the Hamba. Specifically, integrating knowledge enriches the factors of UTAUT2, particularly performance expectancy, by providing knowledge about what benefits that can occur by adopting technology. The findings demonstrate that in contexts where overall knowledge is scarce, individuals may rely on external sources or support systems to gain insights into the utility and feasibility of technology adoption.

Moreover, this study reveals that knowledge acts as a calming factor, easing concerns about technical expertise and understanding. In settings where individuals lack familiarity with technology, accessible knowledge resources can decrease worries, and hence facilitate adoption. This highlights the adaptable nature of technology adoption processes and underscores the importance of addressing knowledge gaps to promote inclusivity and accessibility.

Trust

Gharaibeh et al. (2018) and Manrai et al. (2021) research on the technological acceptance of mobile banking services in Jordan and digital payments in India respectively underscores the importance of trust in influencing customers' attitudes towards new technology. When defining trust, they refer to literature within banking and payment services, emphasizing its significance in both the technology itself and the technology provider.

The definitions provided by Gharaibeh et al. (2018) and Manrai et al. (2021) resonate with the observations made in this particular context. It is seen that trust emerges as a critical factor for customers to even consider embracing new technology, reflecting a common thread across diverse technological landscapes. However, this study reveals a nuanced understanding of trust, wherein it can manifest in two distinct ways. Firstly, trust may stem from customers' personal belief in the technology and its potential benefits. This intrinsic trust is rooted in the perceived reliability and efficacy of the technology, as well as the positive outcomes it promises to deliver. Secondly, trust can also be influenced by interpersonal relationships, with individuals endorsing the technology's benefits to others. This social aspect of trust highlights the role of trusted sources in shaping perceptions and facilitating technology adoption.

Effects in society

The last factor, effects in society is of great importance when implementing a technology in a developing context. The study has found that it has a direct effect on the intention to adopt and the way technology is used by women in this context. To include effects in society as a factor in the UTAUT2 theory is unique and has not been found in any earlier research on the topic. Instead, this finding further connects the UTAUT2 theory to the gender theory and the effects of gender-focused technology in a developing context, which makes this research stand out from earlier research.

6.1.2 Contributions to gender theory and the effects of gender-focused technology

The observed societal benefits further strengthen the connection between women's economic empowerment and overall community development. This link is emphasized by the findings of Duflo (2012), World Bank (2024), and the IMF (2024), which collectively indicate that providing women with opportunities and greater access to financial resources leads to more positive outcomes for children and communities due to women's spending priorities. While some men also contribute to their communities, women tend to emphasize their spending on society, family, and household to a much greater extent. The findings from this study support the conclusion that women's economic empowerment leads to positive effects for children and families, as well as broader societal benefits.

The findings align with the argument that economically empowering women can shift gender norms and improve societal conditions. Abdi (2019) highlights that gender disparities in Sub-Saharan Africa are often perpetuated by cultural norms favoring males. However, providing women with economic opportunities or tools like the Hamba can challenge and redefine these norms. Specifically, Duflo (2012) studies underscore the importance of directly empowering women. The findings of this study support this notion, emphasizing that the technology's explicit attribution to women was a significant success factor for its adoption and subsequent effects.

Conversations with the women revealed that knowing the technology was designed for them was crucial in overcoming initial hesitations. This realization empowered them and boosted their confidence. Furthermore, the introduction of the Hamba facilitated a new purpose for women's gatherings, shifting their focus to business activities. As emphasized by the World Bank (2024), this approach enabled women to broaden their social networks and increase the exchange of information and support. This initial step in questioning norms and sharing experiences was crucial in fostering empowerment and enhancing their understanding of their rights.

Observations and conversations indicate that this empowerment is a key factor in women's increased confidence and their ability to question and redefine traditional gender norms. The explicit focus on women's needs in the design and promotion of the Hamba played a vital role in its successful adoption and the positive socio-economic impacts observed.

To conclude, In a development context such as rural Zimbabwe, the growth potential is significant. When new technology demonstrates positive effects for both individuals and the community, it increases people's interest in adopting and using the technology. This, in turn, supports the broader goal of achieving gender equality and economic development, as women's empowerment becomes a catalyst for societal transformation.

6.2 Practical implications

From a practical perspective, the study's implications are profound for for-profit companies and technology providers aiming to enhance technology adoption in developing communities. Hence, the text below outlines key implications found in the study that these actors should have in mind.

Emphasize value proposition

Companies should prioritize highlighting their technologies' value, particularly emphasizing benefits beyond immediate financial gains. The findings suggest that there is a strong demand for technologies that can create value and improve livelihoods in rural and developing communities. More specifically, the findings underscore the importance of value assessment over price sensitivity in technology adoption contexts. Companies should emphasize the value proposition of their technologies, particularly in contexts where the benefits extend beyond immediate financial gains.

Adapt business models

Companies should ensure that their business models align with the needs and expectations of their target customers, facilitating easy access to and utilization of technology.

Recognizing the important role of the lease-to-purchase model and ownership status in technology adoption among rural women in development contexts, companies

must also adapt their business models to offer flexible financing options. By emphasizing the benefits of ownership and social status associated with their products, marketing efforts can resonate with cultural values and aspirations. Collaborations with financial institutions can streamline financing processes, while educational initiatives raise awareness and address misconceptions. Customized products that address specific community needs further enhance adoption potential, ultimately enabling companies to better meet the needs of rural consumers and drive market penetration.

Establish robust support systems

From the findings, it becomes evident that companies must align their business models with the needs and expectations of the target customers. This involves offering products or services at an affordable price point but also ensuring that the surrounding business model facilitates easy access and utilization of the technology. It becomes evident that companies should prioritize the establishment of robust support systems, including training, mentorship, and technical assistance, to address barriers to adoption and enhance user confidence. Technologies can be introduced in developing areas without fully developed support systems. However, these systems should evolve collaboratively with customers based on their evolving needs and preferences. By providing structured and ongoing support, companies can reduce barriers to using the technology and enhance users' confidence and capability in integrating new technologies into their daily lives. Sustained support systems not only boost the perceived ease of use but also enhance the overall perceived value of the technology, making users more willing to adopt and utilize it effectively.

Foster trust and transparency

Build trust through transparency, reliability, and a commitment to customer success, demonstrating credibility and reliability as technology providers. The study highlights the importance of knowledge dissemination and trust-building in technology adoption. Ensuring that customers gain the right knowledge about the technology and how to operate it efficiently is crucial for building trust and fostering the long-term adoption that is needed for it to be sustainable in the long run. Moreover, building trust through community leaders and respected individuals with higher social status can enhance the perceived reliability and trustworthiness of the technology. Transparency about the business model and charging for products and related services can also contribute to building trust and sustainability in technology adoption initiatives.

Companies have the opportunity to establish themselves as reliable partners by demonstrating transparency, reliability, proximity, and a commitment to customer success. This may involve providing clear information about product pricing, features, and support services, as well as delivering on promises made to customers. To establish this, the findings regarding social influence emphasize the importance of recognizing and addressing the influential role of social networks, especially among rural women in developing countries. Technology providers should understand the prevailing gender hierarchies and cultural norms and leverage positive social influ-

ences to promote technology adoption. This involves engaging community leaders and respected actors to endorse and support the technology and highlight successful use cases within the community. In addition, peer support groups should be established, and negative perceptions should actively be counteracted through clear and evidence-based information.

Overall, the study's practical implications emphasize the need for tailored strategies that address the unique socio-economic, cultural, and contextual factors influencing technology adoption for women in rural developing areas of sub-Saharan Africa. By prioritizing efforts to communicate the value, align business models, build supportive environments, leverage positive social influences, and foster trust and knowledge dissemination, for-profit companies and technology providers can contribute to sustainable and inclusive technology development in this context.

6.3 Future research

Age-Specific Technology Adoption and Usage

Future research should investigate the role of age in technology adoption and usage, particularly in similar contexts. It is important to distinguish between different age groups to understand how age influences the motivation behind using technology. Some observed differences in technology adoption may be attributed to age, and it would be valuable to identify any specific age intervals that are more inclined to use technology for individual benefits versus societal benefits. Exploring these age-related differences can provide insights into how to better approach and engage various age groups. For instance, understanding whether younger or older individuals are more driven by personal advantages or community welfare can help tailor communication and support strategies. This knowledge can enhance the effectiveness of technology adoption initiatives by addressing the unique motivations and barriers faced by different age groups.

More studies with the proposed framework

Future research should incorporate both qualitative and quantitative methods to deepen the understanding of technology adoption in rural developing areas. The quantitative research should involve the development and administration of a structured survey based on the UTAUT2 model, incorporating the additional factors, knowledge, and trust. Statistical analysis, such as Structural Equation Modeling (SEM), should be used to test and validate the framework across different rural settings. By adding more research to the framework it will provide a comprehensive understanding of the barriers and facilitators to technology adoption in a developing context.

Business model of the technology provider

Future research should investigate and develop sustainable business models for for-profit companies and technology providers in rural Africa, as this was only touched upon in this research. This includes exploring existing models used in similar contexts and assessing their effectiveness through literature reviews and case studies. The findings should identify key elements for sustainable and scalable business models tailored to the needs of rural communities, especially for women. This research will hopefully contribute to ensuring the long-term usage of innovative technologies in these areas.

Focus on women

Lastly, further investigation into women's roles in technology adoption is necessary. This research has shown differences in technology acceptance and usage between men and women, especially in a development context. The lack of significant findings in previous studies regarding these differences may be due to insufficient female representation, highlighting the importance of focusing on women. Therefore, more research is needed to confirm these differences and to uncover new insights not addressed in this report.

7
Conclusion

This study provides an extended version of the UTAUT2 framework explaining the influencing factors behind the adoption and usage of solar-powered electric tricycles (Hamba) by women in rural Zimbabwe, launched by the company Mobility for Africa. Further, the study reveals several positive effects that the use of these electrical tricycles has led to, both for the women and the rural communities. In addition to the provided framework, the study analyzes the actions taken by Mobility for Africa that most significantly increased the use of e-tricycles. The model and the analysis together offer an excellent knowledge base for for-profit companies or organizations aiming to launch technological products designed to improve the lives of, especially women, in rural developing communities.

In this case, the influences that determined why the e-tricycles were adopted included performance expectancy, social influence, and price value. The perceived benefits and affordability of the technology, when communicated effectively, were crucial for adoption. Social influences, encompassing the opinions and behaviors of peers, family members, and community leaders, played a significant role in both the initial adoption and continued usage of the technology. Additionally, knowledge dissemination and trust-building were vital to generate by the technology provider in shaping perceptions of performance and effort expectancy, further enhancing adoption and sustained use.

More specifically, knowledge dissemination played a crucial role in shaping perceptions of the believed benefits of technology and its believed ease of use. By providing women with information about the benefits and ease of use of electric tricycles, technology providers like Mobility for Africa could help build confidence and trust in the technology. Trust-building, facilitated by transparent communication and reliable support, further enhanced acceptance and usage. Additionally, ongoing support mechanisms ensured that users felt empowered to troubleshoot their issues and maximize the benefits of the technology. In contrast, having a good supporting infrastructure or making sure that the technology is perceived as fun is not that important when it comes to adoption. Hence, e facilitating conditions and hedonic motivation showed a weak influence.

However, when it came to the usage of the Hamba, facilitating conditions and hedonic motivation became more important and were shown to have a medium influence on how the women decided to use the technology. Interestingly, pre-existing habits and economic activities could easily be changed if the technology showed great po-

tential when used differently. It became evident that providing value goes beyond just individual benefits. The women demanded a technology that they, as well as the community, could benefit from. Furthermore, the effects found in society confirm that the adoption of electric tricycles indeed has led to increased income, social status, health, and independence for rural women. Moreover, societal changes, including higher school attendance, increased livelihood in the community, and a decline in negative behaviors like prostitution and domestic violence, were observed. Hence, by focusing on gender-specific challenges and potential solutions, the research highlights the importance of empowering women through improved mobility, ultimately fostering a more developed, inclusive, and equitable society.

These findings have significant practical implications for for-profit companies and technology providers seeking to enhance technology adoption in developing communities. The case company, Mobility for Africa, successfully drove the adoption of e-tricycles through several strategies that other organizations can emulate.

The successful implementation of these strategies has created a favorable environment for the widespread adoption and continued use of electric tricycles and provides a valuable framework that can be applied to comparable initiatives in developing regions. It is therefore important that organizations prioritize strategies that emphasize the value proposition, tailor business models, establish robust support systems, leverage social influences, and promote trust and transparency. These efforts are crucial to promote sustainable and inclusive technology use. Moreover, tailored approaches that take socio-economic, cultural, and contextual factors into account are crucial to drive adoption and create positive socio-economic development outcomes in rural communities.

Bibliography

Abdi, A. (2019). Women are the key to economic development in third-world countries. *King's College London*. https://www.kcl.ac.uk/news/women-are-the-key-to-economic-development-in-third-world-countries

Addy, M. N., Addo, E. T., Kwofie, T. E., & Yartey, J. E. (2023). Predicting the adoption of e-procurement in construction project delivery in sub-saharan africa: An application of utaut2. *Construction Innovation*, *23*(5), 1038–1053.

Apfel, D., & Herbes, C. (2021). What drives senegalese smes to adopt renewable energy technologies? applying an extended utaut2 model to a developing economy. *Sustainability*, *13*(16), 9332.

Balaria, F. E., Pascual, M. P., Santos, M. D., Ortiz, A. F., Gabriel, A. G., & Mangahas, T. L. S. (2017). Sustainability of e-trike as alternative mode of public transportation system: The case of cabanatuan city, philippines. *Open Journal of Civil Engineering*, *7*(3), 362–377.

Bell, E., Bryman, A., & Harley, B. (2019). *Business research methods*. Oxford University Press.

Bishop, T., Barber, C., Charman, S., & Porter, G. (2018). Enhancing understanding on safe motorcycle and three-wheeler use for rural transport.

Bloom, D. E., Kuhn, M., & Prettner, K. (2017). Invest in Women and Prosper. *FINANCE & DEVELOPMENT*, *54*(3), 50–55. https://www.imf.org/external/pubs/ft/fandd/2017/09/pdf/bloom.pdf

Bugaje, A. I. (2023). *Standalone solar-based power supply for electric mobility in rural areas of developing countries* [Doctoral dissertation, Technical University of Berlin].

Castanha, J., Pillai, S. K. B., & Indrawati. (2020). What influences consumer behavior toward information and communication technology applications: A systematic literature review of utaut2 model. *ICT Systems and Sustainability: Proceedings of ICT4SD 2020, Volume 1*, 317–327.

Chibaro, M., Tsvere, M., & Tukuta, M. (2022). Road transport infrastructure and agricultural competitiveness for tobacco small-holder farmers in the northern region of zimbabwe. *Transport & Logistics*, *22*(53).

Chikweche, T., Bloemen, S., & Mwenye, D. (2023). Innovative new product adoption of renewable energy mobility products at the bottom of the pyramid the case of hamba, an integrated community-driven solution. *Journal of International Consumer Marketing*, *35*(2), 194–214. https://doi.org/10.1080/08961530.2022.2085644

Duflo, E. (2012). Women empowerment and economic development. *Journal of Economic Literature*, *50*(4), 1051–1079. Retrieved April 14, 2024, from http://www.jstor.org/stable/23644911

Dutta, S., & Shivani, S. (2020). Modified utaut2 to determine intention and use of e-commerce technology among micro & small women entrepreneurs in jharkhand, india. *Re-imagining Diffusion and Adoption of Information Technology and Systems: A Continuing Conversation: IFIP WG 8.6 International Conference on Transfer and Diffusion of IT, TDIT 2020, Tiruchirappalli, India, December 18–19, 2020, Proceedings, Part II*, 688–701.

European Union. (2023). *Rural vision*. https://rural-vision.europa.eu/action-plan/connected_en#bridging-urban-and-rural-through-the-eu-urban-mobility-framework

Gharaibeh, M. K., Arshad, M. R. M., & Gharaibh, N. K. (2018). Using the utaut2 model to determine factors affecting adoption of mobile banking services: A qualitative approach. *International Journal of Interactive Mobile Technologies*, *12*(4).

IMF. (2024, April). Macroeconomic developments and prospects for low-income countries - 2024 [[Online; accessed 14. Apr. 2024]]. https://www.imf.org/en/Publications/Policy-Papers/Issues/2024/04/02/Macroeconomic-Developments-and-Prospects-For-Low-Income-Countries-2024-547064

Manrai, R., Goel, U., & Yadav, P. D. (2021). Factors affecting adoption of digital payments by semi-rural indian women: Extension of utaut-2 with self-determination theory and perceived credibility. *Aslib Journal of Information Management*, *73*(6), 814–838.

Ministry of Foreign Affairs & International Trade. (n.d.). Agriculture [Accessed on February 16, 2024]. https://www.zimfa.gov.zw/index.php/about-us/zimbabwe-in-brief/agriculture

Mobility for Africa. (2021).

Mwenye, D., & Bloemen, S. (2023). Renewable energy and mechanisation in the smallholder sector: Experiences from wedza e-mobility pilot study. *Journal of Agricultural Extension and Rural Development*, *15*(4), 139–146. https://doi.org/10.5897/JAERD2023.1379

Porter, G. (2002). Living in a walking world: Rural mobility and social equity issues in sub-saharan africa. *World development*, *30*(2), 285–300.

Qiu, X., Jin, J., He, R., & Mao, J. (2022). The deviation between the willingness and behavior of farmers to adopt electricity-saving tricycles and its influencing factors in dazu district of china. *Energy Policy*, *167*, 113069.

Situation, Z. (2022). Poor road infrastructure an impediment to development of nkayi: Chief [[Online; accessed 14. April. 2024]]. https://www.zimbabwesituation.com/news/poor-road-infrastructure-an-impediment-to-development-of-nkayi-chief/

The Food and Agriculture Organization. (n.d.). Zimbabwe [Online; accessed 28. Mar. 2024]. https://www.fao.org/in-action/building-capacity-environmental%20agreements/activities/africa/zimbabwe/es

The World Bank. (n.d.). Rural population (% of total population) - zimbabwe [Accessed on February 16, 2024]. https://data.worldbank.org/indicator/SP.

RUR.TOTL.ZS?end=2022&locations=ZW&most_recent_value_desc=true&start=1960&view=chart

United Nations. (2023). Sustainable development goal 8: Decent work and economic growth [Accessed: 2024-05-27]. https://sdgs.un.org/goals/goal8#overview

United Nations Development Programme. (2019). *Human development report 2019: Beyond income, beyond averages, beyond today - inequalities in human development in the 21st century*. United Nations Development Programme. http://hdr.undp.org/en/2019-report

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

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS Quarterly*, *36*(1), 157–178. https://www.jstor.org/stable/41410412

Voa News. (2023). *Voa News*. https://www.voanews.com/a/india-s-transition-to-electric-vehicles-powered-by-three-and-two-wheels-/7266243.html

Williams, M. D., Rana, N. P., & Dwivedi, Y. K. (2015). The unified theory of acceptance and use of technology (utaut): A literature review. *Journal of enterprise information management*, *28*(3), 443–488.

Women's World Banking. (2023, March). Empowering Women in the Developing World: Barriers and Opportunities - Women's World Banking [[Online; accessed 2. Apr. 2024]]. https://www.womensworldbanking.org/insights/repost-empowering-women-developing-world-barriers-opportunities

World Bank. (2012). World Development Report 2012: Gender Equality and Development. https://hdl.handle.net/10986/4391

World Bank. (2024). Transport [Accessed on May 14, 2024]. https://www.worldbank.org/en/topic/transport/overview

Worldometer. (2024). Zimbabwe demographics 2023 (population, age, sex, trends) - worldometer [[Online; accessed 28. Mar. 2024]]. https://www.worldometers.info/demographics/zimbabwe-demographics

Zhao, P., & Yu, Z. (2020). Investigating mobility in rural areas of china: Features, equity, and factors. *Transport policy*, *94*, 66–77.

Zikhali, W. (2017). Potholes in zimbabwe: A hindrance to economic development. *European Journal of Research in Social Sciences Vol*, *5*(2).

Zimbabwe Vulnerability Assessment Committee. (2023). The 2023 zimvac rural livelihood assessment.

A

Appendix 1

A.0.1 Interview Guide A - People using the Hamba

1. Can you walk me through the factors that influenced your decision to apply for the Hamba?
2. Did you encounter any challenges or concerns regarding the Hamba before you applied?
3. What social factors influenced your decision to apply for the Hamba?
4. What other external factors have influenced your decision to apply for the Hamba?
5. How do you use the Hamba?
6. How often do you use the Hamba?
7. For what specific purpose do you use the Hamba?
8. Could you imagine not having the Hamba anymore?
9. How much did you have to adapt to your previous way of working when you started using the Hamba?
10. Has the way you use the Hamba changed since you started using it?
11. How do you think the charging station and the staff have affected your experience of using the Hamba?
12. How has the adoption of the Hambas impacted your economy and livelihood?
13. How do you think the adoption of the Hambas has impacted your community and other people?
14. Has the usage of the Hamba changed your thoughts about your own economy?
15. How do you feel when you are using the Hamba?
16. (internal/external usage) How do you perceive the usability of the Hamba?
17. (external) Do you have the necessary resources to utilize the Hamba effectively? (Facilitating conditions)
18. Looking ahead, how will you continue to utilize the Hamba in the future?
19. If you were to get much money from the Hamba, what would you want to do with it?
20. What changes would you like to see with the Hamba in the future?

A.0.2 Interview Guide B - People accepted, but not yet using the Hamba

1. Can you describe your familiarity with Hamba?
2. What are your general thoughts about the Hamba?
3. Can you walk me through the factors that influenced your decision to apply for the Hamba?
4. How do you think your past experiences with other technologies, vehicles or products may have influenced your decision regarding using the Hamba?
5. How do you perceive the benefits of the Hamba compared to alternatives?
6. How do you perceive the drawbacks of the Hamba compared to alternatives?
7. Can you envision ways that the Hamba might improve access to markets and services for users in your community?
8. Did any other external factors play a role in your decision not to use Hamba?
9. Do you feel like you fully understand how the Hamba works?
10. Did you seek information or advice from others before deciding not to use the Hamba?
11. How have family, friends, or community leaders influenced your decision not to use an electric tricycle?
12. Have you noticed any trends or pressures in your community that might discourage the adoption of Hambas?"
13. Do you think that the Hamba would fit in your daily activities?
14. How is your idea of how the Hamba would fit your financial situation?
15. How do the different financial aspects associated with the Hamba influence your decision to not apply for the Hamba?
16. Considering the costs associated with acquiring and using a Hamba, do you think it would offer good value for money?
17. Looking back, is there anything that could have encouraged or persuaded you to apply for the Hamba?
18. Under what conditions might you consider using Hambas in the future?

A.0.3 Interview Guide C - people not accepting the Hamba

1. Can you describe your familiarity with Hamba?
2. What are your general thoughts about the Hamba?
3. Can you walk me through the factors that influenced your decision not to apply for the Hamba?
4. How do you think your past experiences with other technologies, vehicles or products may have influenced your decision regarding using the Hamba?
5. How do you perceive the Hamba compared to alternatives? (benefits/drawbacks)
6. Can you envision ways that the Hamba might improve access to markets and services for users in your community?
7. Did any other external factors play a role in your decision not to use Hamba?
8. Do you feel like you fully understand how the Hamba works and how to operate it?
9. Did you seek information or advice from others before deciding not to use the Hamba?
10. How have family, friends, or community leaders influenced your decision not to use an electric tricycle?
11. Have you noticed any trends or pressures in your community that might discourage the adoption of Hambas?"
12. Do you think that the Hamba would fit in your daily activities?
13. How is your idea of how the Hamba would fit your financial situation?
14. How do the different financial aspects associated with the Hamba influence your decision to not apply for the Hamba?
15. Considering the costs associated with acquiring and using a Hamba, do you think it would offer good value for money?
16. Looking back, is there anything that could have encouraged or persuaded you to apply for the Hamba?

DEPARTMENT OF TECHNOLOGY MANAGEMENT AND ECONOMICS
DIVISION OF ENTREPRENEURSHIP AND STRATEGY
CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden
www.chalmers.se

CHALMERS
UNIVERSITY OF TECHNOLOGY