Master's in Urban, Energy and Environmental Planning

Specialisation: Cities and Sustainability

Examining the Effectiveness of Public-Private Partnerships in E-Mobility Planning for Sustainable Transportation in East Africa

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Summary

There is a need for sustainable transport solutions to meet the increasing transport demand caused by rapid urbanisation and population growth in East African cities. New alternatives should enhance economic wellbeing while taking climate change mitigation and air pollution reduction into account to increase the liveability in cities. E-mobility is an innovation which promises to provide several of these options and it has already gained interest and traction within the East African region. Currently, most of the e-mobility uptake is led by private sector companies. However, fostering its large scale adoption to cause a transformation in the transport sector is complex and there are barriers that have to be addressed.

Partnerships offer the possibility of combining skills and resources to effectively achieve common goals. Public-private partnerships (PPPs) are a common collaboration structure used to implement transportation projects and positive application in e-mobility can be seen in certain European countries. Nevertheless, cross-sector collaborations can bare challenges. In African countries, issues such as a weak institutional capacity within certain governments can deter the private sector from seeking collaboration. Still, PPPs give the opportunity to share risks and leverage strengths, an aspect of particular importance when introducing new innovations.

This thesis aims to examine the question on whether PPPs can effectively enhance e-mobility uptake in East Africa through a combination of desk-based research and qualitative interviews. A literature research provides the conceptual framework on collaborations and PPPs, the idea of shared roles and responsibilities as well as the potential barriers of PPPs are reviewed. Finally the current status of PPPs in East Africa is presented before looking at best practice examples in the European e-mobility sector. Data collected through in-depth interviews provides perspectives from different sector representatives that can verify and/or supplement the theoretical framework and reveal the openness to collaborate in PPPs and what PPP structures can enhance e-mobility uptake.

The research reveals regional and sectoral differences in the willingness to collaborate in PPPs. The public and private non-profit sector players overall indicate an openness to PPPs. Public for-profit sector players show the greatest variance. In Kenya and Tanzania, collaboration with the government is actively sought by private companies to ease processes of e-mobility uptake and avoid bureaucratic hurdles. In Rwanda, partnerships with the government are welcomed by not considered a necessity. In Uganda, private companies avoid collaborating the government due to their slow pace and overall perceived incompetence.

The study provides insight on the preferred structures of collaboration with the government and clarifies the desired roles of the public and private sectors. In most cases, private for-profit sector players try to avoid direct project initiation with the government where the flow of money is required. Instead, their prefer collaboration with the public sector involves the

government creating of an enabling environment where start-ups and business are given the chance to test new innovations and eventually thrive in the market. This environment would involve incentivising and the creating supporting policy to boost the EV market while falling in line the governments' CO_2 emission reduction strategies.

Additionally, other collaborations that play a significant role in e-mobility introduction and adoption are highlighted, such as with vehicles financers and awareness raising institutions. This research discovers the difference between *wanting* and *needing* to collaborate with the government to effectively introduce e-mobility, where the regional differences perceived by stakeholders are shown and interpreted.

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List of Abbreviations

BOT	Build-Operate-Transfer
BRT	Bus Rapid Transit
CO2	Carbon Dioxide
DART	Dar Rapid Transit Agency
(E-)2&3W	(Electric) 2 and 3 wheelers
E-mobility	Electric Powered Mobility
EV	Electric Vehicle
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIS	Geographic Information System
ICE	Internal Combustion Engine
NDCs	Nationally Determined Contributions
NGO	Non-Governmental Organisation
PFP	Private For-Profit
PNP	Private Non-Profit
PPP	Public Private Partnership
SDGs	Sustainable Development Goals
UDART	Usafiri Dar es Salaam Rapid Transit
UNDP	United Nations Development Programme
VAT	Value Added Tax

1. Introduction

1.1. Background and context of the research

Current mobility trends in East Africa show high numbers of used vehicle imports, inefficient public transport systems and in most cases a persistent desire to acquire a personal motor vehicle. These factors all contribute to increasing CO2 emissions, congestion, air and noise pollution leaving a plethora of negative externalities on the society (Sustainable Mobility for All, 2022). As cities continue to expand horizontally, with population growth and rates of urbanisation which continue to rise exponentially, the demand for system changes that focus on efficient, green transport modes becomes of utmost importance (Njoroge and White, 2023).

E-mobility is one of the solutions to many of the challenges mentioned above. Not only in the form of electric cars, but also other individual e-mobility solutions such as e-bikes, e-motorcycles and especially electric public transport offer relief to the societal and environmental challenges mentioned above. East Africa specifically has become a nucleus for e-mobility innovation (Power Africa, 2023). However, despite the opportunities that e-mobility solutions offer, it is still a relatively new transformation in mobility and organising its integration into the East African environment comes with challenges of its own. High upfront costs, lack of access to energy and lack of relevant skills are some the biggest challenges developing countries face when trying to include e-mobility into their transport systems. Setting up reliable, decentralised publicly accessible charging infrastructure, for example, is something that not only requires space but also a significant injection of funds as well as adequate technical and managerial skills. Despite this service being a key enabler of fostering EV uptake, limited budgets and in some cases lack of the applicable skills makes it impossible for governments to venture into such endeavours on their own (IEA, 2023a; Altug and Firat, 2018; Amos and Zanhouo, 2019; Arezki et al., 2017; Yang, 2008 cited in Batjargal and Zhang, 2022).

Partnerships and collaborative activities are becoming more common and widespread in both developed and developing economies to address social and economic development issues (Stibbe, Reid and Gilbert, 2018; Ighobor, 2017; Selsky and Parker, 2005). They enable different entities such as government agencies, non-profit organisations, civil society organisations and the private sector to share resources, leverage strengths and minimise risks to pursue specific objectives and achieve common goals (Yurdakul, Kamaşak and Yazar Öztürk, 2022). When looking at the provision of transport services, Public Private Partnerships (PPPs), are most commonly applied partnership (Batjargal and Zhang, 2022; Liu et al., 2015). They make it possible for the public and private sector to share risks and pool their resources be it from a financial standpoint, engaging the required man-power or having access to the necessary knowledge (Xiong et al., 2021). These opportunities provided by PPPs are the core reason why this paper focuses on examining their effectiveness in e-mobility planning for sustainable transportation in East Africa.

1.2. Problem Statement

PPPs have already proven to be highly valuable in e-mobility uptake in several European countries (more information in section 3.4 below). Why are they not appearing to be the implementation method of choice in East Africa?

Sharma (2012, p. 150) quotes a number of studies which determine that "PPPs provide several advantages and opportunities in terms of fiscal stabilization, fund flows and efficiency gain to the developing countries". Especially in the African context where in many cases the government's strength and certain skills could be considered as relatively low, the potential benefits of PPPs are high. Private partners on the other hand, whether local or foreign, might be more hesitant to join such business partnerships in countries that have unstable economic and political climates, and complicated institutional set ups (Yurdakul, Kamaşak and Yazar Öztürk, 2022). Nevertheless, the potential gains offered make it worth investigating what role they can play in e-mobility uptake in East Africa, leading to the main problem statement:

Can PPPs be an effective strategy for e-mobility planning in East Africa?

To be able to answer this question, the following research sub-questions will be addressed:

1) What are the opportunities for PPPs in e-mobility uptake?
2) What is the current landscape of e-mobility planning in East Africa, is there an openness for PPPs?
3) What are the main obstacles and challenges faced by PPPs in East Africa?
4) Which other collaborations play a significant role in making e-mobility uptake effective?

1.3. Justification of the study

This study is justified by the need for addressing the challenges of urbanisation, increasing demand for transport and environmental concerns of current mobility trends in East Africa through sustainable transport solutions. E-mobility holds the potential to mitigate some of these challenges. However, its implementation involves several stakeholders for example from the energy, transport planning and industry sectors (UN-Habitat and Urban Electric Mobility Initiative (UEMI, 2022). Executing this undertaking as a solo actor would be difficult, highlighting the need for partnerships. This study also aligns with the United Nations Sustainable Development Goals which East African countries have committed to achieving, specifically those goals relating to sustainable cities, climate action and partnership for the goals.

E-mobility is still fairly new on the African continent, as with most new innovations, introduction in a considerably untested market is risky and in the case of e-mobility often involves substantial costs, the chance of effective risk and cost sharing would address aspects that could interest both the public and private sector players. Finally, some research analyses public-private partnerships in an African and East African context, but there is a lack of comprehensive research evaluating the effectiveness of PPPs in the e-mobility context.

1.4. Scope and limitations

Geographical Scope: This research paper will focus on East African countries, specifically Uganda, Kenya, Tanzania and Rwanda.

Types of E-Mobility Considered: All e-mobility options present in the mentioned countries will be considered. This is because while 2 & 3 e-wheelers might currently have the highest market share, certain challenges of e-mobility uptake also encompass larger electric vehicles.

Stakeholder Groups: Besides the public sector represented by national, regional or local public agencies, the private sector entities considered in this PPP research will encompass for-profit and not-for profit players including NGOs, the civil society as well as multi-lateral organisations.

PPP Effectiveness Measurement: Effectiveness will not be measured by any concrete values, instead, it will be considered by satisfaction of the engaged stakeholders (i.e. the public and private sector players, as well as the benefit for and uptake by the end users). This describes the scope as well as a potential limitation as it is based on perception. In the long-run, uptake could be measured by increasing number in e-mobility vehicles and related services e.g. charging infrastructure.

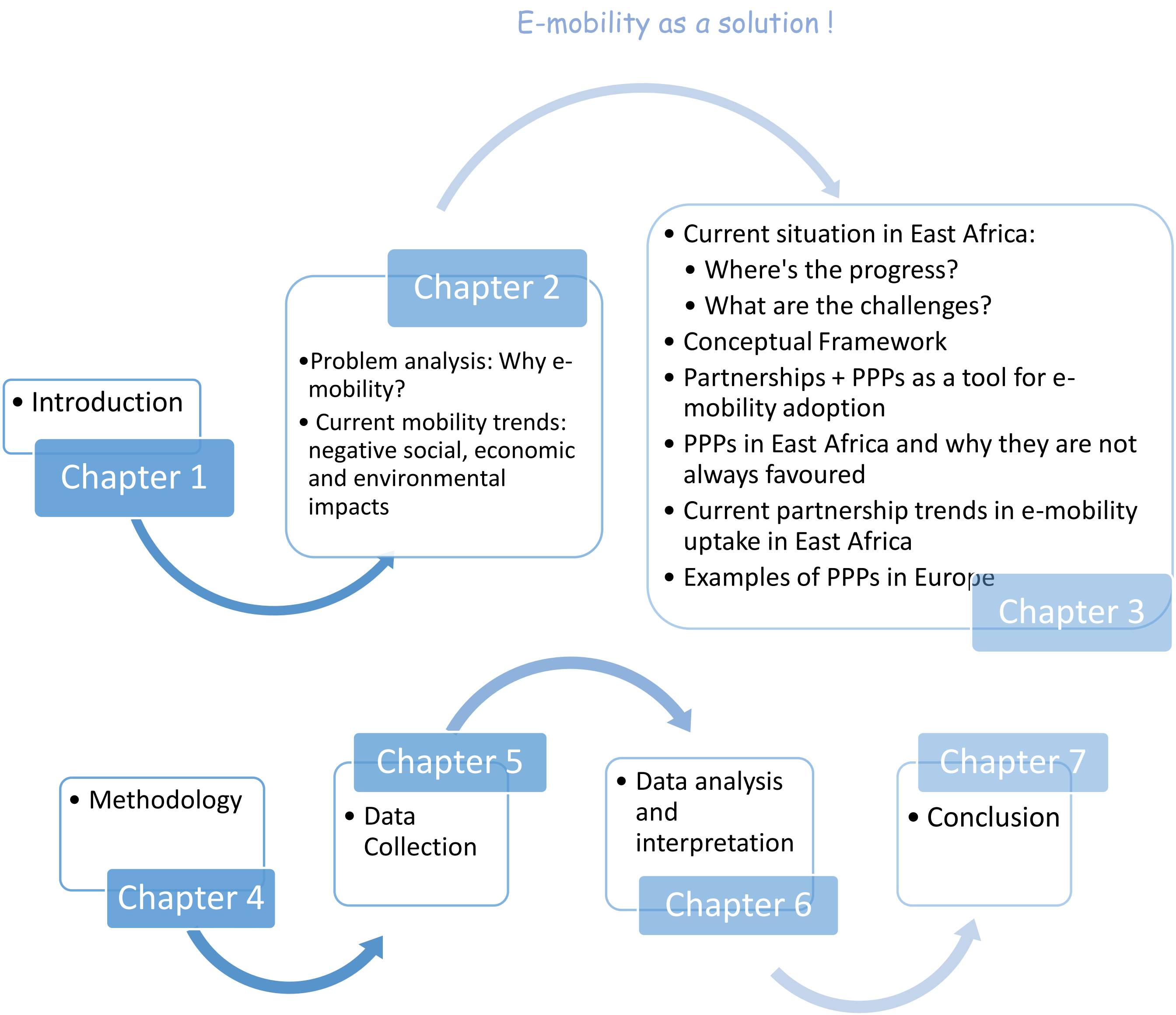
Other limitations of the study include the following:

Generalisation: According to data availability, certain findings might address a “developing country context”, “Africa” or “sub-Saharan Africa” without concrete separation of East Africa. This would only relate to the non-empirical / theoretical research. Empirical data collection will be focused on the defined geographical scope.

Qualitative Research Methodology: As this study relies on qualitative interviews with a limited number of relevant stakeholders, more in-depth insight can be gained, however, it may not capture a larger scale opinion as would have been done with quantitative data collection.

Continually Changing Topic: As e-mobility is currently an active and continually changing and progressing topic, certain aspects including the regulatory environment could change within a relatively short span of time potentially impacting the relevance of results in the near future.

1.5. Structure of the thesis



2. Background - Problem analysis

In this next chapter, two main aspects will be addressed. Firstly, a comprehensive look at current challenges in the mobility within African cities will provide an understanding as to why there is a need for system changes. These regional push factors, together with global ones show why e-mobility is being addressed as a solution in this paper. Secondly, a more detailed look at e-mobility in the East African setting will show that while e-mobility might offer alleviation to many of the aforementioned challenges, the effort of achieving effective implementation should not be underestimated as there are several challenges of introduction which need to be overcome.

2.1. Current mobility problems in developing countries

Affordable, reliable and safe transportation systems play an essential part in making cities liveable and in enhancing their economic potential. The growth and development of cities is directly related to the growth and development of transport systems. Without proper planning, these systems will grow in an ineffective, chaotic manner. Many African cities are facing these exact problems. While cities continue to expand horizontally and experience rapid urbanisation, most governments fail to provide formal public transport systems (Njoroge and White, 2023).

In most of the biggest African cities, informal public transport systems have emerged to fill this growing mobility gap and they are now responsible for roughly 70% of all transit rides. While providing a source of transport, these privately owned and operated informal services do not adequately address urban mobility challenges. They often operate without state and city regulation meaning that factors such as the quality and price are difficult to control (Fried and Abubaker, 2019). The lack of quality control results in informal public transport vehicles often being ill-maintained and posing a higher road safety risk to road users both within vehicles and non-motorised transport road users. This, coupled with an underdeveloped infrastructure for pedestrians and cyclists as well as non-functional traffic lights and narrow poorly maintained roads in many African cities contributes to why road traffic deaths numbers in Africa are higher than in any other region of the world. Although only possessing 3% of registered vehicles in the world, 20% of global road fatalities occur on the African continent (Njoroge and White, 2023).

Another major contributor to road accidents is the use of used vehicles. Africa leads in used vehicle imports with 40% of all used vehicle imports ending up on the continent, most of which come from the European Union, Japan and the United States of America. In most cases, regulation on used vehicle imports is absent, and for the limited cases where regulation exists, poor enforcement makes restrictions futile. 60% of annual vehicle registrations in Africa are used vehicles. In Kenya, 97% of imported vehicles are used vehicles most of which are roughly 7 years old, just under the import age limit of 8 years. In Uganda, this age limit is 15 years while in Rwanda, according to the United Nations Environment Programme (UNEP) (2020), no age limit exists.

Besides road safety concerns, used vehicles are a major contributor to local air pollution and greenhouse gas (GHG) emissions leading to detrimental effects on environmental and human health. If current mobility trends in Africa continue, fine particulate matter emissions ($PM_{2.5}$) are forecasted to increase by 40% by 2030 compared to the 2012 values (Sustainable Mobility for All, 2022). While Africa still contributes the least to global GHG emissions, trends show a significant increase on the continent. Studies in Njoroge and White (2023) of 24 sub-Saharan African countries show that road transport CO_2 emissions grew by over 70% by 2018 compared to the 2009 scenario.

The current mobility situation in most African countries also bares a high financial burden on residents. Often, the lowest-income residents are most significantly affected by the high cost of transport and are forced to pay large portions of their income to commute. In some countries, workers are forced to quit their jobs as they are unable to pay the high commuting costs (Njoroge and White, 2023). While transportation is essential to access necessary goods and services, a continuation of current trends would be detrimental. New solutions and alternative transport modes coupled with responsible policy and regulation need to be provided to account for the increasing urbanisation and increasing congestion in African cities to allow for growth and development in a sustainable manner. The following section will review how policy makers have become aware of current mobility challenges and what steps are being taken to change current trends.

2.2. Need for system changes

While awareness of climate change and the need to decarbonise have existed since the 90s with first steps on combined action being addressed in the Kyoto Protocol of 1997, since the Paris Agreement in 2015, the urgency of decarbonisation has been an internationally recognised agenda (European Commission, 2012). Unlike previous agreements, this agreement, adopted at the United Nations Climate Change Conference (COP21), was the first time that all nations of the world signed a binding agreement to combat climate change together. Through country specific national climate action plans, termed Nationally Determined Contributions (NDCs), countries share their planned methods to reduce greenhouse gas emissions to meet the goals stated in the Paris Agreement. Since the agreement, the transportation sector is one of the leading areas in low- and zero-carbon solutions (UNFCCC, 2015).

Nevertheless, these solutions need to be implemented on a larger scale as still approximately 25% of greenhouse gas emissions come from the transport sector. Initiatives need to not only consider a reduction in tailpipe emissions such as by switching to e-mobility, but also need to ensure e-mobility solutions are accompanied by renewable energy sources. According to Birch-Jeffrey (2021)'s fact sheet on climate change "95% of the world's transport energy still comes from fossil fuels". Currently, most of the transport related GHG emissions come from developed countries with China accounting for 23% and the United States of America for 19%. The African continent currently contributes the smallest share at only 3.8% of the global GHG emissions. However, if current trends of population growth coupled with economic growth and vehicle uptake increase continue, it is expected that transport related CO2 emissions will significantly increase in the upcoming decades. Figure 1 below shows the expected development of transport emissions in different African countries in the next 30 years.

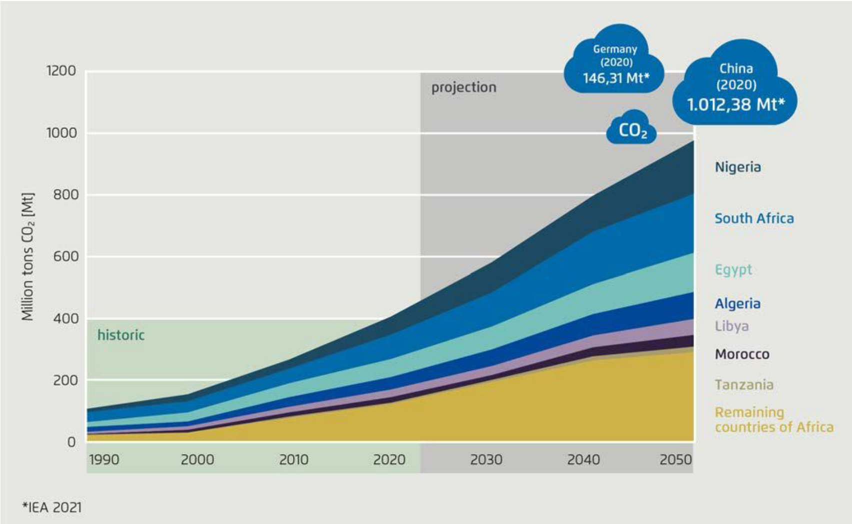


Figure 1 Expected Transport CO2 Emissions in Africa without system changes (Slocat GSR BAU Scenario depicted in Agora Verkehrswende and GIZ, 2023)

Yet in a continent where concerns and investments are usually required and reserved for meeting basic human development needs such as housing, education, health, sanitation and access to water and energy, many citizens and governments consider worrying about environmental protection to be a luxury that is not a top priority. These countries underestimate the strong link between ecological well-being and social and economic growth (Altenburg and Assmann, 2017). In such instances, international pressure can be the required nudge to help countries re-assess their strategies and include underrepresented topics. In November 2022, seven years after the Paris Agreement at COP21, COP27 held in Egypt did precisely that by placing the focus on Africa. Three months before the conference, almost all African countries had submitted their Nationally Determined Contributions to the United Nations Framework Convention on Climate Change (UNFCCC) (Agora Verkehrswende and GIZ, 2023). In the recent years, a few countries in Africa had taken noticeable steps towards improving their e-mobility policy and regulation by developing National E-mobility Policy and Market Readiness Framework and National Electric Mobility Roadmaps (Warren, 2023). Still, setting ambitious plans is only the first step, countries now need to shift from planning to large scale implementation.

Due to the currently still low rates of motorisation compared to other regions, African countries have the opportunity to leapfrog conventional trajectories in vehicle uptake, as they have already successfully done in other sectors (Agora Verkehrswende and GIZ, 2023; Sustainable Mobility for All, 2022). However, in order to be able to successfully implement such strategies, a significant amount of - often international - financial support is necessary (Altenburg and Assmann, 2017). Starting to mobilise funds to support developing countries combat climate change is one of the main takeaways from the COP27. As yet, financial commitments from 2020 have still not yet been fully met (UNFCCC, 2023). Nevertheless, besides the introduction of low-carbon mobilities, in order to fully address challenges mentioned in section 2.1 above, African governments need to combine these new drivetrain technologies with policies and measures that encourage a shift to sustainable transport alternatives. They need to establish safe, affordable, reliable and multimodal public transport including considering how to effectively incorporate the paratransit sector (e.g. shared taxis and informal minibuses) and they need to develop urban infrastructure in a way that reduces the demand of commuting (Agora Verkehrswende and GIZ, 2023; Jia et al., 2022).

For the purpose of this study, however, focus will be placed on e-mobility as a sustainable transport solution and how its uptake can best be incorporated. The next section will explain the opportunities that e-mobility offers and why it can be suitable for the African continent.

3. Literature Review of e-mobility and partnerships

This section is divided into two main segments: e-mobility and partnerships. For e-mobility most of the research is focussed directly on the East African setting, because a full background and reasoning for choosing this topic was already provided in the problem analysis section above. The partnership section, on the other hand, is providing context as to why partnership and specifically PPP were a chosen. Both sections conclude with concrete examples of the respective topics in East Africa. The purpose of this entire chapter is to shed light on current research on these topics, and to introduce the concepts which form the basis of the theoretical framework, data collection section and the analysis.

3.1. Overview of E-Mobility in East Africa

In this section, the current position of e-mobility in East Africa is analysed including the types of entities already active in the region and the policy landscape. Finally, the areas presenting challenges for e-mobility will be highlighted, which will be taken into consideration for areas where PPPs can be applied to enable the uptake.

3.1.1. Introduction to E-mobility as one of the Solutions

Electric powered mobility (e-mobility) can be defined as the movement of people and goods in vehicles driven by motors that are powered by energy stored in batteries (World Resources Institute, Shell Foundation and Cities and Infrastructure for Growth (CIG) Uganda, 2021). It has emerged as one of the major solutions to decarbonise the transport sector, benefits which can be maximised by charging using renewable energies (UN-Habitat and Urban Electric Mobility Initiative (UEMI), 2022). It offers a variety of advantages and opportunities which go beyond its zero tail pipe CO2 emissions and helping to reach decarbonisation targets. A switch to electric vehicles directly leads to a reduction in air and noise pollution which benefits not only the environment but also the health of the population in the region. The introduction of these new technologies creates new jobs and employment opportunities and although having high initial investment costs, a study on *E-Mobility Solutions for Rural Sub-Saharan Africa: Leveraging Economic, Social and Environmental Change* states that the total cost of ownership of electric vehicles is significantly lower than the same vehicles with internal combustion engines (ICEs) (Siemens Stiftung, 2020). In Kenya for example, the total cost of ownership of an electric 2 or 3 wheeler is estimated at a third lower than the corresponding ICE vehicle (Conzade et al., 2022).

This is largely due to the higher efficiency of electric vehicles compared to ICEs. In ICE gasoline powered vehicles, only 12% - 30% of the energy from the gasoline reaches the wheels / is converted into motion (US Department of Energy, 2017). Figure 2 shows an example of the flow of energy in a gasoline powered car from tank-to-wheel. As seen, after various losses, only a small amount of energy is used to move people and goods. In electric vehicles on the other hand roughly 77% of the energy is used to power the wheels (US Department of Energy, 2017).

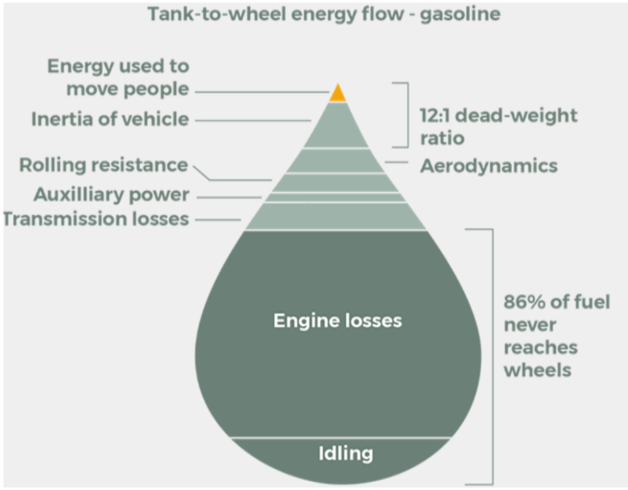


Figure 2 Energy flow of gasoline vehicles from tank-to-wheel (Ellen MacArthur Foundation, 2015)

Additionally, a shift to e-mobility would allow those countries that rely on fuel imports to shift from that dependency to alternative energy sources (Agora Verkehrswende and GIZ, 2023).

Although electric car sales still only accounted for 14 % of global car sales in 2022, there was an increase of 60% in 2022 relative to 2021 and several governments have indicated their commitments to incorporate electric mobility into their strategies as a response to curb climate emissions (IEA, 2023b; Cliffe Dekker Hofmeyr, 2023). Specifically for Africa, the use of e-mobility should be an obvious choice. The continent fulfils most of the requirements necessary to be suited to an e-mobility insurgence. It possesses an abundance of the necessary raw materials for electric vehicle and battery construction and although currently often lacking the required grid infrastructure and regulation, it is considered to have the largest renewable energy resources in the world (Agora Verkehrswende and GIZ, 2023). The young population, with 70% of sub-Saharan Africans being under the age of 30, has the potential to learn and apply technological innovations at a fast pace and to provide the required workforce for local electric vehicle production (United Nations, 2022).

3.1.2. Current Research on the E-Mobility Situation in East Africa

A study from October 2023 by the Africa E-Mobility Alliance places East Africa ahead of all other regions in Africa in terms of ‘e-mobility readiness’. This study analyses e-mobility readiness by the use of a tool with 23 indicators divided into the categories: finance, deployment, policy and energy (Africa E-Mobility Alliance, 2023a). The current e-mobility climate in East Africa is fast changing and the solutions encompass more than electric passenger cars such as e-boats, e-trucks, public transport solutions such as e-buses and in some instances also e-trackers. In high-income countries the transition to individual electric mobility tends to focus on enabling the procurement of e-cars. In African low-income countries on the other hand, electric 2 and 3 wheelers prove to be the significantly more applicable solution (Sustainable Mobility for All, 2022). This is because in several African countries 2 and 3 wheelers (2&3Ws) i.e. bicycles, motorcycles, rickshaws/tuk tuks are already a main mode of transport. Therefore, electric mobility introduction in these countries is taking this into account and the transformation is beginning in those popular transport segments as opposed to simply following the paths of higher income countries that are further along in their e-mobility transformation (Sustainable Mobility for All, 2022; Conzade et al., 2022). Table 1 below shows some examples of technical solutions in the 2&3W sectors in the East African region.

Table 1 Electric 2 & 3 Wheeler Solutions in East Africa (Siemens Stiftung, 2020; Cliffe Dekker Hofmeyr, 2023 SAFIRIDE, 2021; Solar-E-Cycles, 2023; Power Africa, 2023; Spiro, 2023 Ekoglobe, 2023; eWaka, 2023; E-Motion, 2023)

Name & Location of Organisation/ Company	Technical Solution provided	Type of Entity
BODAWERK Uganda	Converts motorcycles to e-motorcycles, local battery assembly and leasing	Private for-profit
Solar E-Cycles Kenya	Solar-powered e-bicycles and tricycles	Private for-profit
Anywhere.Berlin GmbH	Off-road cargo e-bicycles and e-motorcycles	Private for-profit
FABIO Uganda	Tailor-made cargo e-bicycles and battery swapping	Private non-profit
Guraride Rwanda	E-bicycle sharing system	Public
SAFI Rwanda	E-motorcycle ride-sharing	Private for-profit
Rwanda Electric Motor Rwanda	E-bicycles and e-motorcycles and battery swapping	Private for-profit
Ampersand Rwanda	E-motorcycles and battery swapping	Private for-profit
Zembo Uganda	E-motorcycles and battery swapping	Private for-profit
ROAM Kenya	E-motorcycles and charging infrastructure	Private for-profit

SPIRO Rwanda (Kenya and Uganda to follow)	E-motorcycles, e-scooters and battery swapping	Private for-profit
Ekoglobe Tanzania	E-tuk tuks, e-motorcycles and charging infrastructure	Private for-profit
eWaka Kenya	E-bicycles, e-motorcycles and e-scooters	Private for-profit
E-Motion Tanzania	Retrofitted e-motorcycles and e-3 Wheelers	Private-private partnership (for-profit)

Despite most of the innovation having been in the 2&3W e-mobility segment, a number of other electric vehicle technical solutions have developed in East Africa within the last few years. Table 2 below highlights a number of these.

Table 2 Other Electric Vehicle Technical Solutions in East Africa (Siemens Stiftung, 2020; EEP Africa, 2021; BasiGo, 2023; E-Motion, 2023)

Name & Location of Organisation/ Company	**Technical Solution provided**	**Type of Entity**
Kiira Motors Uganda	Building e-buses and some e-cars	Public-Private Entity
ROAM Kenya	Converts conventional internal combustion engine (ICE) vehicles e.g. cars, buses and trucks into EVs and charging infrastructure	Private for-profit
ASOBO Kenya, Tanzania, Uganda	Replacing conventional boat engines electric drivetrains	Private for-profit
BasiGo Kenya	E-buses	Private for-profit
E-Motion Tanzania	Retrofitting e-buses, e-cars	Private-private partnership (for-profit)

Although the information in Table 1 and Table 2 above is only a sample of the different e-mobility solutions present in East Africa, the literature review, as can be seen by the data presented, revealed an overwhelming majority of E-2&3W initiatives in the e-mobility sector. Kenya leads the East African pack with regards to the number of e-mobility start-ups, with an estimated 50 in 2023 compared to 11 in Tanzania and 9 in Uganda (Owino, 2023). Kenya also tops the ladder when looking at capital financing raised for e-mobility initiatives. By March 2023, the start-ups had raised US$ 52 million compared to US$1 million in Tanzania and US$5 million in Uganda (AEMDA, 2022; Owino, 2023). However, when considering the actual EV uptake, both Tanzania and Rwanda supersede the Kenyan numbers with an estimated over 3000 and over 700 annual sales in EVs compared to an estimated 280 in Kenya (Africa E-Mobility Alliance, 2023a).

Kenya's e-mobility transformation has been led by the private sector, and according to Owino (2023) the initiatives in Tanzania, Uganda and Rwanda on the other hand, have been steered by the government. Using this information and considering the abovementioned ratios of number of start-ups and raised funds compared the actual number of vehicles on the road, inspires the question on whether public sector involvement increases the effectiveness of e-mobility implementation and uptake. This question will be further addressed throughout this paper.

Despite the relatively high vehicle uptake in Tanzania, the charging station situation proves to be significantly more grim. Data collected by the Africa E-Mobility Alliance (2023a) through expert interviews and using data from chargemap.com shows 1 charging station in Tanzania, 13 in Kenya and 27 in Rwanda. The effects of limited charging infrastructure for EV uptake in general and also with relation to the different vehicle types will be discussed more in section 5.1.1.

3.1.3. Outline of Current E-mobility Policy Landscape in East Africa

In this section, the current e-mobility policy developments in East Africa are investigated. Policy plays an important role and can significantly incentivise or hinder e-mobility uptake. Carefully structured policy can benefit the community and end users while also boosting the economy and contributing to climate protection goals (Cliffe Dekker Hofmeyr, 2023). Tax reform policy that boosts local EV manufacturing, for instance, can make this sustainable mobility option more affordable for the community while creating jobs and boosting local value chains (Cliffe Dekker Hofmeyr, 2023).

A number of African countries have recognised this necessity and are implementing frameworks on a national level to promote e-mobility. Kenya, for example, has prioritised e-mobility in its National Climate Change Action Plan as well as in their Nationally Determined Contributions (NDCs) (Siemens Stiftung, 2020). Rwanda has similarly also highlighted the importance of e-mobility in its NDCs and is actively encouraging the uptake of and the investment into e-mobility through a variety of fiscal and non-fiscal incentives (Cliffe Dekker Hofmeyr, 2023). Policies need to be established in a way that applies best to each specific country. The idea of local applicability is also discussed in Altenburg and Assmann (2017) in the context of the establishment of green policies. The authors state that each country's specific circumstances and particular context ought to be taken into consideration when green policies are established. Only with such an understanding can the benefits of such policy be maximised and potential risks managed. The authors proceed to state that "each country should choose [and customise their] own path of green transformation" (Altenburg and

Assmann, 2017, p. 33-34). The same is applicable in the case of e-mobility introduction where it is imperative that African countries take the lead in driving the process forward in the way that best suits the local needs and requirements.

Table 3 below highlights some of the main e-mobility policies and incentives to encourage the uptake and use of electric vehicles. Only policies or incentives directly relating to e-mobility were included. Generalised policies for instance relating to sustainable transport or transport infrastructure without specifically addressing e-mobility were not taken note of.

Table 3 Main E-Mobility Policies and Incentives in East Africa (Cliffe Dekker Hofmeyr, 2023; Owino, 2023; Warren, 2023; Roychowdhury, Chattopadhyaya and Chandola, 2023; Africa E-Mobility Alliance, 2023b)

Country	Policies	Comments
Kenya	Fiscal Incentives • Reduction of excise duty from 20% to 10% in 100% battery powered EVs • Special tariff for EV charging • Special tariff for local assembly of EVs • 10% instead of 20% import duty on importing EV parts	
	Other policies • National Climate Change Action Plan 2018 – 2022	Outlines measures to include technical standards, incentives and public procurement
	• Integrated National Transport Policy 2020 (updated)	Implores government for further research and standards
	• 2023 Budget Policy Statement (Cliffe Dekker Hofmeyr, 2023; Owino, 2023)	Highlights government commitment to fund charging infrastructure in urban areas and highways, financially support EV and motorcycle assembly, create incentives for e-mass transit systems
	• National E-mobility Policy (Warren, 2023)	To be adopted in 2023
Rwanda	• Updated nationally determined contribution (NDC)	Outlines importance of EVs and vehicles emission standards, concrete targets of mobilising funds
	Fiscal Incentives • Corporate income tax of 15% for e-mobility investors • Reduced electricity tariffs for EV charging stations	

	• Reduced electricity tariffs for off-peak charging • 0% VAT; import tax and excise duty for all EVs, spare parts, batteries and charging infrastructure equipment Non-Fiscal Incentives • Rent free government land for fast charging stations • EV charging provisions in building codes • Preferential parking for EVs • Access to bus lanes • Preferential hire of EVs by government • Age limit on used vehicles • Restricting access of ICE vehicles to certain zones • Enforcing emission standards (Cliffe Dekker Hofmeyr, 2023; (Roychowdhury, Chattopadhyaya and Chandola, 2023)	
Tanzania	• 0% Import Tax and VAT on solar batteries / batteries used directly in charging infrastructure (Africa E-Mobility Alliance, 2023b)	

While some East African countries appear to have made greater strides with regards to e-mobility policy and incentive development, there is often still a lack of harmony between all relevant policies as well as a lack of cohesion among the relevant government institutions. Especially when taking a close look at certain policy, the importance of EVs might be highlighted, but concrete implementation measures are often lacking. In several cases, legislation that would be relevant to e-mobility needs to be amended to include it (Africa E-Mobility Alliance, 2023b). Of the four East African countries studied in this paper, Uganda and Tanzania bare the least number of incentives and policy directed towards e-mobility.

3.1.4. Overview of Barriers to E-Mobility Uptake in African Countries

Despite presenting several opportunities, the establishment of e-mobility in East Africa bares several challenges. This section will analyse the most commonly occurring challenges with regards to e-mobility introduction on the African continent. These challenges expose the areas where there is biggest need for intervention to enable e-mobility uptake thereby also revealing the areas where there might be opportunity for PPP application.

A review from various sources (Oliver, 2022; Valero and Wink, 2022; Sustainable Mobility for All, 2022; UN Environment, 2018; Conzade et al., 2022) state high upfront costs, lack of technical expertise, gaps in energy access, lacking charging infrastructure and range anxiety as some of the main challenges of e-mobility establishment in African countries.

High upfront costs

While the overall costs of owning an electric vehicle as opposed to its fuel powered counterpart has lower costs on a long term perspective, electric mobility has high upfront costs. Especially in low income countries, these high upfront costs can form an impenetrable barrier for the communities unless financing options through investments, subsidies, micro-finance with affordable rates as well as other innovative business models regarding ownership are offered. National and international financing institutions can play a crucial role in enabling access to electric vehicles (Valero and Wink, 2022; Conzade et al., 2022).

Lack of Technical Expertise

As with any innovation, skill and expertise on the topic tend to be initially limited and need to be acquired and distributed. The same can be said for electric mobility on the African continent. Adequate capacity building is necessary to ensure that local knowledge within the sector is increased for a long-lasting uptake (Oliver, 2022).

Lack of Energy Access

In this case, the lack of access to energy includes a physical lack of access to electricity by not being connected to a power supply, a lack of access due to financial constraints as well as a lack of access due to a low reliability of electricity supply. The introduction of e-mobility also sparks the issue of using the sparse grid electricity to charge EVs as opposed to fulfilling the basic needs electricity demand (Oliver, 2022; Sustainable Mobility for All, 2022).

Range Anxiety and a Lack of Charging Infrastructure

Although these two concerns are often mentioned separately, the amount of range anxiety could be influenced by the density of charging infrastructure. Range anxiety refers to the fear of the battery becoming empty, without having access to charging infrastructure. According to Conzade et al. (2022), a study performed in Kenya revealed that despite most of the surveyed vehicle owners being aware of the benefits of electric vehicles, range anxiety proved to be one of the primary concerns to the adoption of EVs in sub-Saharan Africa. When it comes to the use of e-motorcycles and larger EVs, the availability of charging infrastructure is crucial to the successful uptake of e-mobility anywhere in the world. E-bikes require smaller scale charging infrastructure, however, the demand is not eliminated and depends on the specific use cases. Charging infrastructure needs to be developed before the demand is there to alleviate range anxiety (Oliver, 2022).

In addition to the main challenges mentioned above, the dominant use of used vehicles in Africa as well as weak to non-existent regulation contribute to the hindrances of e-mobility uptake on the African continent (Conzade et al., 2022). The lack of regulation is both with regards to regulating used vehicle imports as well as creating policy that motivates switching to electric mobility (Valero and Wink, 2022).

3.1.5. Summary regarding e-mobility

Sustainable transport solutions are globally recognised as an important step to tackle climate change, rapid population growth and urbanisation rates as well as other socio-economic deficiencies of current mobility trends in East Africa. The development of low-carbon transportation such as e-mobility is one of the key strategies to improve the efficiency in transportation systems. Currently trends in e-mobility uptake in East Africa show that local applicability has already been taken into account as new e-mobility providers focus on 2&3Ws, which are the most commonly used vehicles in East Africa. For Kenya and Rwanda, several developments have already been made in the policy landscape. Tanzania and Uganda are still lagging behind in policy development and incentivising. Nevertheless, Tanzania currently dominates the East African market in electric vehicles despite falling short when it comes to available charging infrastructure compared to countries such as Kenya and Rwanda, whose private sector has invested more time and money into its development.

Despite the developments in e-mobility uptake, effective local-context-based introduction is demanding and can at first sight appear to have certain impenetrable barriers. The variety of the challenges in section 3.1.4. above show that an introduction of e-mobility goes significantly beyond the vehicles themselves and involves considering the entire ecosystem. Different strategies can be taken to increase planning efficiencies in the different stages of introduction. Collaborations are an example of a strategy to heighten the chances of successful execution of EV uptake. For instance, challenges such as high upfront costs can be tackled by spreading investment costs among several actors in joint investments as well as through partnerships between manufacturers and/or providers and asset financing companies (Sustainable Mobility for All, 2022; Power Africa, 2023). In East Africa, partnerships are emerging to tackle issues on the energy supply and also range anxiety as well as to address financing challenges. Power Africa (2023) states that the uptake of EV on the African continent can be accelerated through collaborations between local innovators and larger global companies.

The next chapter of this paper will look further into the strategy of collaboration. Firstly, the idea of collaborations and partnerships will be discussed, including their international recognition as a strategy to work on achieving common goals. Thereafter, more attention will be paid to public-private partnerships. This sub-section explains why different stakeholders might choose to venture into PPPs, the role PPPs can play in public service provision as well as some theoretical framework on the different types of PPPs.

3.2. Conceptual Framework

This section will present the conceptual framework applied to support the entire progression of this research. The first theory will address the reason for looking into sustainable mobility options to address the challenges of current mobility trends. The second will look at the idea of changing systems and adjusting regulation in a way that enhances economic growth while sharing the responsibility of protecting the environment. Finally, framework surrounding PPPs will be introduced.

3.2.1. Sustainable Development Goals (SDGs)

The backbone of this research paper is based upon the understanding of the need for sustainable transport options such as e-mobility to achieve sustainable growth within cities and communities. It is upon this basis that one considers implementing and upscaling e-mobility, as well as considering which options are the best for achieving this. As a result, this framework is presented first in this section.

While not a traditional theory, the United Nations' SDGs provide a comprehensive framework for addressing global challenges and achieving sustainability. Sustainable mobility should be "essential, efficient, safe and green" and it plays an important role in achieving the SDGs (World Resources Institute, Shell Foundation and Cities and Infrastructure for Growth (CIG) Uganda, 2021). Figure 3 below demonstrates how exactly transportation directly relates to the SDGs.

Figure 3 The relation between the SDGs and sustainable transport (Sustainable Mobility for All, 2021)

As this research addresses the planning and uptake of e-mobility, the SDGs can provide guidance to assess the contribution of e-mobility in achieving sustainability objectives and overcoming the challenges mentioned in the problem analysis section.

3.2.2. The Relevance of Public-Private Partnerships for Service Provision

Introduction to Partnerships

Before looking directly into PPPs, this section will introduce partnership and how it differs from traditional development implementation approaches. Thereafter, the development of partnerships to new public governance and their role in ecological modernisation will be described.

According to Brinkerhoff (2002), previous strategies to socio-economic development have been ineffective and development is no longer possible without partnership. The concept that the government is *solely* responsible for public service provision and for ensuring that the needs of the citizens are met is outdated. This traditional understanding was considered 'state-centric' in which businesses were seen as having ego-centrical agendas that focussed on maximising their own gain even if it was at the cost of the society or the environment and civil societies were seen as being too feeble to have real impact (Glasbergen, Biermann and Mol, 2007). Newer approaches, sometimes referred to as 'pluralistic' but now more commonly as 'vertical coordination' and 'New Public Governance' acknowledge and promote the fact that sustainability transitions require multiple stakeholders at multiple scales of governance working on policy and implementation together (van Montfort and Michels, 2020). This means collaborating on a global, regional, national and local level and including different sectors i.e. different levels of public institutions, businesses as well as citizens in the civil society (Geels et al., 2019). This shift from top-down 'government' towards a broader 'governance' approach places emphasis on a strong society as opposed to placing emphasis on a strong state, where knowledge sharing and action across social networks is promoted (Geels et al., 2019; Glasbergen, Biermann and Mol, 2007).

Partnerships enhance the outcome of projects and activities beyond what either party would have been able to achieve on their own, through the sharing of labour, costs, skills and minimisation of risks (Brinkerhoff, 2002). They are formed on a voluntary basis and provide a platform for synergy where it is assumed that the outcome of cooperation and collaboration produces greater results than if the parties had worked separately and they are mutually beneficial (Liman et al., 2021; Osbourne, 2000). While the term 'partnership' indicates a certain amount of collaboration, the scope and range of the activities cover a multitude of possibilities (Osbourne, 2000). Public-private partnerships are often categorised as being based on legally binding documents, whereas other partnerships are significantly more loosely structured, some entail several activities while others place focus on one (van Montfort and Michels, 2020).

In informal collaborations between the civil society and the public, for instance, the partners are only loosely connected e.g. by form of letters of intent, and partnerships are often based on trust (van Montfort and Michels, 2020; Pozil and Hacker, 2017). While informal partnerships can be an effective for implementing social change in communities, askew political interests coupled with limited resources and poor administrative accountability means that in sub-Saharan Africa they are often laced with corruption (Pozil and Hacker, 2017, Mwangi, 2020). A network approach can also be considered as another type of partnership, although some journals (van Montfort and Michels, 2020) would argue this categorisation. According to that journal, while different partnership definitions tend to emphasise the partners' orientation towards a collective goal / collective goals, networks are not necessarily based on realising a common goal but rather by the mutual interdependency of the different actors: social, economic and public (van Montfort and Michels, 2020). Provan and Kenis (2007), on the other hand, acknowledges the more common occurrence of 'serendipitous' networks, but states that 'goal-oriented' networks, while less frequent, also exist (Provan and Kenis, 2007).

Ecological Modernisation

This concept describes the strategy of restructuring environmental regulation in a way that makes it a joint responsibility (Hanf, 2003). It entails the idea of achieving environmental sustainability through the application of more efficient, green and low-carbon technologies, in both the final products as well as the manufacturing process (Baer and Singer, 2023), while creating new patterns of collaboration and division of labour between the public and private sector (Hanf, 2003). Ecological modernisations highlights the following:

- Pollution prevention is everyone's responsibility and requires joint action: collaboration instead of confrontation between the public and private sectors (Hanf, 2003).
- Sustainable development requires a new 'regulatory framework' that combines economic and ecological developments: providing solutions that lead to increased environmental quality while driving technological innovation, creating markets and enhancing competition (Janicke, 2008; Hanf, 2003).
- Government should develop appropriate interventions and parameters to guide economic activity in a way that benefits the society: a deregulation shift from 'hard' direct regulation instruments to 'soft' interventions developed with relevant stakeholders from business, the civil society and science (Hanf, 2003; Ali, 2013)
- A shift from the idea that protecting the environment only generates costs to realising that numerous benefits of preventing pollution including not only monetary benefits but also saving energy and other resources as well as waste reduction (Ali, 2013)
- The importance of conserving natural resources and including aspects such as recycling and technological innovations (Ali, 2013).

Ecological modernisation falls in line with the idea of governance. It describes the needs for a change from traditional 'top-down' approaches and looks to cross-sector participatory practices, to accompany technical change, to achieve environmental protection in a way that benefits the economy and the society. The introduction of e-mobility can be seen as an example of ecological modernisation. Government can collaborate with academia to research the environmental benefits of e-mobility. By creating incentives and favourable regulation in collaboration with private stakeholders, startups and businesses can be given an environment to experiment and thrive and the society can benefit from rewards such as the lower total cost of ownership of electric vehicles compared to gasoline vehicles.

Reflection of partnerships

In this paper, partnerships will be considered as different organisations or sector players, with their different roles, responsibilities and approaches cooperating on common targets (OECD, 2006). With the partnership goal of this research being orientated towards e-mobility planning and uptake in East Africa, this paper will only consider cross-sector collaborations for public affairs. Often, in the context of international development, different sector collaboration can give new opportunities that no actor would have been able to tackle (effectively) alone (Brinkerhoff, 2002). Especially with introducing new innovative ideas, products or designs into markets, as is the case when thinking of e-mobility planning in East Africa, partnerships offer the chance of different perspectives and shared ideas to not only create win-win situations for the involved parties, but also for the public that benefits from the more effective and efficient service provided. For this reason, the focus on partnerships is chosen in this paper.

Although the occurrence of partnerships is relatively new in most African countries, whether due to push or pull factors or due to their own (needs) assessments, governments are undergoing shifts in their previous methods of public service provision to include more stakeholders. NGOs and Civil Society Organisations are becoming involved in the provision of social services as well as in encouraging governments to engage with the private sector and citizens on their views and requirements (UNECA, 2005). A shift towards more democratic systems also expects citizens to be more involved in decisions and processes of public service provision (UNECA, 2005). Transport authorities in several East African countries highlight the importance of private sector participation in policy documents (Galuszka et al., 2021) and as the incorporation of digital solutions in the transport sector is gaining traction, it is important to mention partnership between the public and technological institutions (Njoroge and White, 2023). Following this general insight into the partnership approach, the next sections will look more specifically at PPPs.

3.2.3. Public-Private Partnerships (PPPs)

This section will take a closer look at public-private partnerships. For several reasons described in this sub-section, PPPs are often a chosen method for providing public services. This section will look at which sectors and entities are involved in PPPs and what the roles and potential benefits for each party are. Finally, after a brief theoretical background of different types of PPPs and the related framework, the next section will focus more onto PPPs in a developing country context.

The World Bank (2022b) describes public private partnerships as "a long-term contract between a private party and a government entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility, and remuneration is linked to performance". Liman et al. (2021) also describes public private partnerships by their long-term contractual arrangement where mutual benefits are pursued. Both the public and the private sector entities involved in PPPs must gain from the project (Nie et al., 2021). With proper planning and implementation, PPPs give the opportunity for social value to be created in a timely and cost-effective manner. The inclusion of global expertise gives projects access to innovative designs and overall efficiency gains (Mohammed et al., 2023).

Public service provision used to be handled exclusively by the public sector. As a result, governments would take the entire risks throughout the lifecycle of projects from planning to construction to the operation of public services (Alfen et al, 2009). That is not to say the private sector was not involved before the era of PPPs. However, in the former set up, the public sector only contracted the private sector to complete certain stages within the infrastructure set up. For example, governments could contract a private sector company to handle the construction process and then either handle the operations on their own or contract the same or another private sector company to operate the completed project (Iossa & Martimort, 2015 in Yurdakul, Kamaşak and Yazar Öztürk, 2022). Nevertheless, governments maintained full ownership of the projects and bore the full risk (Ismail, 2013). By engaging in PPPs, governments share some of this risk with private sector players through shared accountability (Mohammed et al., 2023; Hammami, Ruhashyankiko and Yehoue, 2006; Alfen et al., 2009).

Over the last two decades PPPs have becoming increasingly common in both developed and developing countries (Alfen et al., 2009). Both for-profit and non-profit private sector players have become involved in collaborating with governments in the provision of education and health as well as infrastructure construction and operation of roads, sanitation and waste water treatment facilities, power supply and transport (Liu et al., 2015; Hammami, Ruhashyankiko and Yehoue, 2006).

Why entities would choose to go into Public-Private Partnerships

There are various reasons why the public sector and private sector entities would choose to go into this form of collaboration. For governments, PPPs are considered as powerful tools to enhance not only the amount but also the quality of public service provision. This is done by being able to tap into the financial resources and the organisational and managerial skills as well the technological capacity and knowledge of the private sector (Yu, Chen and Sun, 2018). For private sector players, building or operating public goods and services offers them the opportunity to increase brand value and generate profits (Batjargal and Zhang, 2022).

A political driver for public entities is to be able to provide these key services without needing to drain public funds, potentially go into debt and without needing to transfer the financial strain onto the citizens by increasing taxes (Alfen et al., 2009). In addition to that, governments look to gain efficiency by increasing the chance for innovation through benefitting from the experience of the public sector while reducing own costs (Yurdakul, Kamaşak and Yazar Öztürk, 2022). It is assumed that the private sector will be more efficient at delivering public services than the government. Some other major determinants for efficiency gains for the public sector within a project are the ability to reallocate and share risks and incentivise payment structures, where payments to the private sector party are undertaken with certain project steps' completion i.e. the private sector party is incentivised to fulfil its obligations and complete the required steps (Mohammed et al., 2023; Alfen et al., 2009).

The exact reasons why entities choose to go into PPPs can also influence the type of PPP they choose to go into. Some of the factors influencing the type of PPP entities chosen include the nature of the project, the financing options and the desired level of private sector participation. The section below introduces the main different types of PPPs structures used in infrastructure projects. A focus is placed on infrastructure projects as lack of adequate infrastructure was identified in section 3.1.4. as one of the main hinderances of e-mobility uptake in African countries.

3.2.4. Types of PPPs

PPP models clarify different aspects of the different types of PPPs such as who builds, owns and operates facilities within the projects. The models are designed to harness the strengths and resources of both sectors and they also specify at what point the transfer of ownership occurs. Table 4 below highlights some of the main PPP models applied in infrastructure projects.

Table 4 Examples of PPP Models (Batjargal and Zhang, 2022; Tshombe and Molokwane, 2016)

Model Name	Description
BOT (Build-Operate-Transfer)	The responsibility of designing, financing, constructing and operating a facility is with the private partner before transferring it back to the public sector after the concession period. The main PPP model applied for new construction projects, termed Greenfield projects
BOO (Build-Operate-Own)	Similar to the BOT, however, in this model, the private sector retains ownership after the contract period and there is no transfer back to the public sector

ROT (Rehabilitate-Operate-Transfer)	Private companies are given the right to rehabilitate and operate a facility by governments and local authorities. After the contract period the facility is transferred back to local authorities.
Operation and Management Contract (O&M)	The operation and management of a public asset is handled by the private partner. The contract contains specific obligations which the private partners must adhere to.
Service Contracts	The private sector operates and maintains a service while the public sector manages and bares the financial risks. This is usually for a short-term period.

If the incorrect model is chosen or the chosen model is simply not correctly structured, PPPs can fall short of the desired outcomes. Having a clearly structured and mapped out framework is crucial for the success and sustainability of public private partnerships (Fabbri and Dapit, 2019). A framework enables that there is a right balance between the public and private sector's interests (The World Bank, 2022a). The next sub-topic briefly explains the main components of a PPP Framework all of which need to be taken into account when structuring and implementing guidelines, manuals and other documents during a PPP process.

3.2.5. PPP Framework

The World Bank (2022a) defines a PPP legal framework as "the sum of a country's laws and regulations, as well as guidance, precedents and other materials, whether legally binding or not, that impact and govern the full lifecycle of PPP projects and confer legal authority on the entities involved in their delivery." This means that a framework is put in place to ensure a clear process while also clearly defining the roles and responsibilities of the involved parties. For PPPs to function, countries need to have stable legislative, regulatory and administrative and contractual framework (Mohammed et al., 2023; Alfen et al., 2009) that is aligned to their national policies, objectives and limitations (The World Bank, 2022a). Annex 3 describes these four different types of framework.

Well-designed framework can boost transparency and integrity thereby making a country more attractive to experienced private sector players and attracting more investment (The World Bank, 2022a). Although the framework plays a crucial role in PPP success, the extent of development in East African countries will only be briefly mentioned in this research project and could therefore be a topic further looked into by other scholars within the scope of a different research topic.

3.3. Previous Research on PPPs in Developing Countries

3.3.1. History and Development of PPPs in Developing Countries

Building upon the introduction of PPPs including insights as to why they could be an attractive approach for different stakeholders, this section will investigates more concretely the PPP situation in developing countries including in which sectors they are most often applied as well as what would encourage and discourage entities in engaging in PPPs.

In developed countries, PPPs typically come into play in the provision of public services such as education, health and waste sanitation management. In developing countries, on the other hand, PPPs help to meet basic infrastructure demands to meet rapidly growing populations and increasing urbanisation. They are therefore seen in the provision of power, water and transportation where they help to reduce the gap between the demand and the supply which is currently estimated at US$ 50-90 billion per annum (Alfen et al., 2009; EAIF, 2023). Figure 4 below depicts the sectoral distribution of PPPs within the 30 year period from 1990 to 2019. As can be seen, most of the PPPs fall into the three aforementioned sector categories: power, water and transportation.

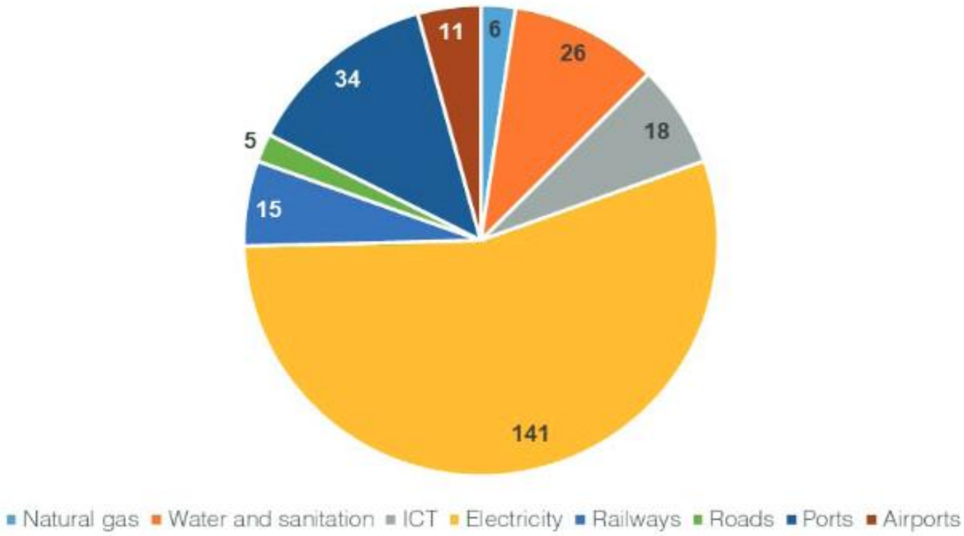


Figure 4 Distribution of PPPs in Africa, per sector, between 1990-2019 (UNECA, 2021)

Historically, African governments funded infrastructure projects by development aid, a trend which several African countries would like to break free from. According to the AU (2015) cited in Dykes and Jones (2016) “Africa wants its proportion of aid in national development budgets to be zero by 2030”. As a result, governments are looking for alternative ways of financing and conducting infrastructure projects, and PPPs provide an alternative.

To support the overall need of infrastructure development as well as the goal of African governments, the World Bank and African Development Bank have committed financial and other resources to African governments to establish effective PPP management capacities. These other resources include access to databases and journals that increase the sharing of relevant knowledge and expertise. Together with the African Union, the African Development Bank developed a reference framework to build necessary infrastructure in an integrated way that enhances trade, stimulates growth and creates jobs. The African Development Bank is also the largest sponsor of the Africa Public-Private Partnership Conference & Showcase which brings together different stakeholders to network, discuss investment opportunities and share best practice PPPs (Dykes and Jones, 2016).

While the number of PPPs are increasing in developing countries, it can be a challenging process for governments and private sector players to decide to engage in PPP projects (Kamasak, Yavuz and James, 2019). Certain factors such as economic and political conditions could make private sector companies hesitant to invest (Zhang and Durango-Cohen, 2012).

Studies by Njoroge and White (2023) reveal that sub-Saharan Africa has the lowest private sector investment in transport systems at 6% compared to the Middle East and North Africa which both have 9% as well as Latin America with 12%. Banerjee, Oetzel and Ranganathand (2006) state that bureaucratic quality i.e. the degree to which government policies are established and implemented competently and effectively, promotes investment by the private sector. This reasoning implies that a lack administrative and organisational structure could be highly off-putting for private sector investors. At the same time, this deficit in organisational structure within the government together with financial limitations might be the main motivating factors, from the governments' perspective, to enter into PPP agreements (Yurdakul, Kamaşak and Yazar Öztürk, 2022). Especially in developing countries, PPPs would offer the opportunity to allow the government to save money, promote economic growth and increase the access to services such as transportation also to lower income groups (Sharma, 2012; Tshombe et al., 2020). Nevertheless, when looking at infrastructure investments in Africa, Sharma (2012) states that close to 70% of them are financed by the governments, 3% from development aid and only a very low percentage of infrastructure investments were financed by PPPs

3.3.2. Examples of PPPs in East Africa

Although PPPs have not existed in East Africa as long as in Europe, there have already been several PPP led projects in East Africa. Some of these projects have had positive results while others would be considered as rather unsuccessful (Tshombe et al., 2020). In this section, the experience thus-far with PPPs in the East African context will be looked at. This will also attempt to give a general understanding on whether PPPs as a project implementation and execution solution are favoured or not, what the roles of each party have been, where investment has mostly come from and if PPPs are likely to be a strategy that continue for future projects or not. Partnering with private sector players in PPPs to enable large scale infrastructure projects is a concept that has been embraced by several East African governments. As this report intends to explore the potential of PPPs in e-mobility introduction of which adequate infrastructure is a critical success factor, more focus will be placed on looking at the history of PPPs in infrastructure projects in East Africa.

Research by Ssebabi (2012) has highlighted PPPs in Uganda in the sectors of transport, energy and business infrastructure, the African Legal Support Facility's *Country Profiles* on Uganda, Tanzania, Kenya and Rwanda also list the PPP projects in the respective countries without going into specific details (ALSF, 2017a; 2017b; 2021; 2022). Tshombe et al. (2020) gives examples of PPP project in Kenya and mentions more recent as well as older PPP project examples from Tanzania and the website 'Construction Kenya' lists some of road construction PPP projects in Kenya and Tanzania (Ndaiga, 2022). To give more insight into how these PPPs might be structured, the main points from three case studies of PPPs in East Africa will be described.

Case Study 1: Kampala-Entebbe Expressway (KEE)

Opened to the public in June 2018 after roughly 6 years of construction, the Ugandan highway connects the Northern Bypass of the Ugandan capital city: Kampala and Entebbe, home to the country's international airport. The 51km long road hosts dual-carriage ways along its entirety and is the first toll road in Uganda (Road Traffic Technology, 2018).

Goal: Reduce traffic congestion in the Greater Kampala Metropolitan Area as well as to reduce travel times and enhance urban development (Odero, 2021).

Type of Partnership: Bilateral cooperation as well as a multi-stakeholder BOT PPP, Operation and Maintenance Contract

Involved parties are highlighted in figure 5 below

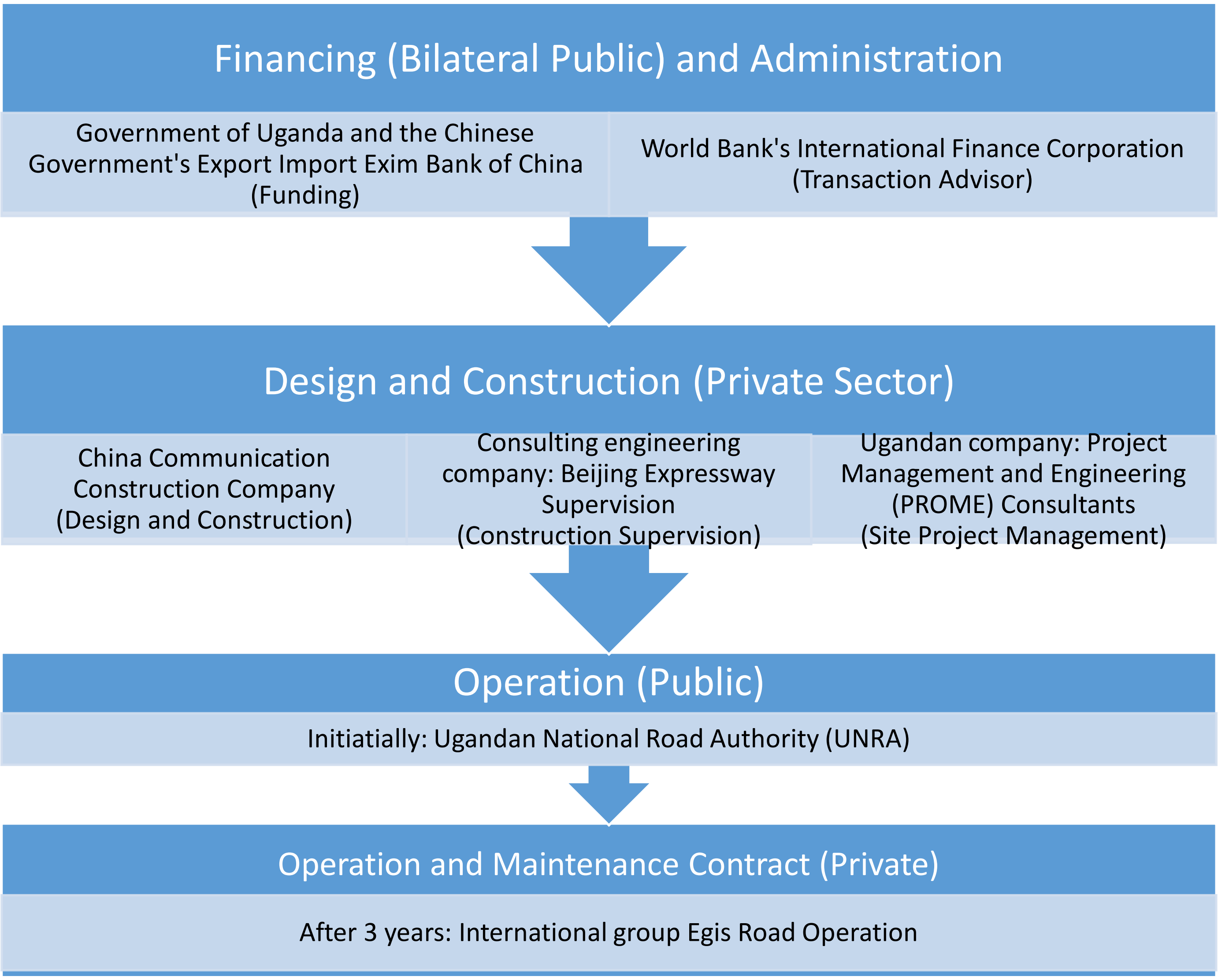


Figure 5 Parties involved in the construction of the Kampala Entebbe Highway (Odero, 2021; UNRA, 2021; Road Traffic Technology, 2018)

While Egis is responsible for toll collection, policy for setting the tariffs is still handled by the government (Egis, 2021). According to Ogwang (2014) even during the construction process, the Ugandan Ministry of Works together with the project’s transaction advisor, the IFC, were discussing how to structure tollgate operation in a way that encouraged private sector investment in the road works.

Knowing it would not be capable of handling this large-scale infrastructure project on its own, the Ugandan Government collaborated with different entities who could bring in fiscal support as well as technical know-how, supervision and administrative expertise throughout the project process. In addition to their own financial contribution towards the construction, the Government of Ugandan handled the engagement and compensation of the local landowners who had to be displaced for the construction of the expressway (Road Traffic Technology, 2018).

Case Study Conclusion

Although coined by some reporters (Mukiibi, 2022) as one of the most expensive road in the world with construction costs of US$9.2 million per kilometre as opposed to the average costs per kilometre in Uganda of between US$750 000 and US$1 million, this PPP project showed several successes (Monitor, 2021). Besides being able to meet the intended goals with travel times from Kampala to Entebbe being reduced to roughly ¼ of their original duration as well as significant decongestion which led to a recovery of 6% of the national GDP, the PPP also managed to complete the project as intended and within the intended timeframe (Ministry of Works & Transport, 2021; Odero, 2021).

Case Study 2: Dar es Salaam Bus Rapid Transit System

The Dar es Salaam Bus Rapid Transit System is another example of a PPP implemented project in East Africa. The project was planned to improve the urban transport system in the city of Dar es Salaam. Historically, the city's main transportation mode were 14-seater minibuses, locally known as daladalas, and as with several cities on the African continent, rapid urbanisation and population growth meant an affordable, reliable and importantly: a high capacity transport alternative had to be established (Jacobsen, 2022; Krüger et al., 2021). Bus Rapid Transit (BRT) Systems can function as a solution to all of the above mentioned demands. Planning of this BRT System began in the early 2000s, however, due to massive delays caused by various hurdles, operations began in 2016 (Jacobsen, 2022).

Goal: Establishment of a bus system which operates in dedicated lanes and due to their high frequency and fast pace can transport people at metro-level capacities while still being able to maintain relatively low passenger fees (Mafwenga, 2021).

Type of Partnership: Cross-sector PPP, Service Contract

The key actors' structure of the Dar es Salaam BRT system is extremely complex as it was an undertaking that involved several stakeholders. However, two main actors involved are the Dar Rapid Transit Agency (DART), a government entity established to regulate the whole system and Usafiri Dar es Salaam Rapid Transit (UDART) who was responsible to running the bus services (Shauri and Mimano, 2022). DART was established by the Prime Minister's Office, Regional Administration and Local Government (PMO-RALG) to oversee the entire project. They oversee bidding and contract creation, marketing and ensuring operational standards, and the profitability of the system – including planning routes, schedules, ticketing amounts, implementation of necessary policies and regulation and resolution of disputes. DART does not directly perform all of the tasks above, they collaborate with various actors from government entities as well as the private sector to ensure all aspects have been covered (Dar es Salaam Transport Policy and System Development Master Plan, 2008). UDART was established by incorporating members from the public and private sectors including previous daladala operators (Shauri and Mimano, 2022).

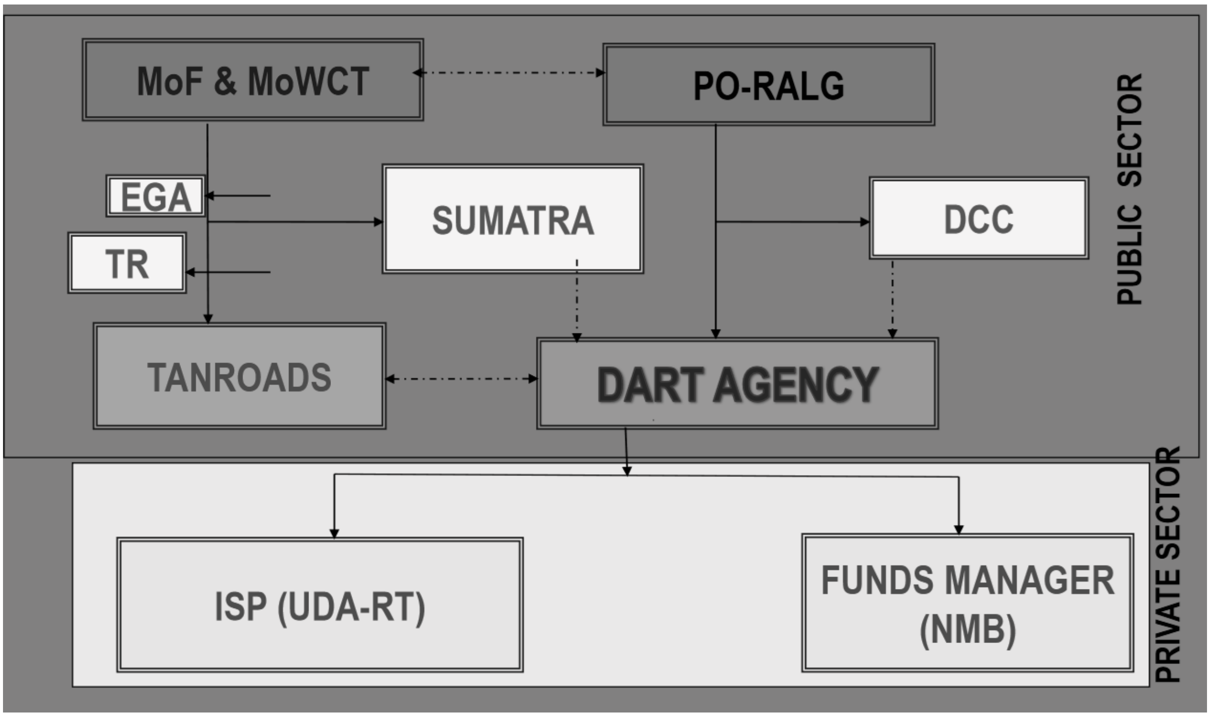


Figure 6 Main partnership members in the DART Project (Mchomvu, Y.E., 2018)

Figure 6 above summaries some of the key service actors for the Dar es Salaam Bus Rapid Transit System. From the public sector, government entities such as the Tanzania National Roads Agency (TANROADS) under the Ministry of Works, Transport and Communication were responsible for the regulation and infrastructure for the service e.g. corridors, stations and complementary infrastructure (Dar es Salaam Transport Policy and System Development Master Plan, 2008). The Ministry of Lands, Housing and Human Settlements Development (MLHHSD) through Dar es Salaam Local Authorities (DLAs) were involved in community engagement and resettlement issues (World Bank, 2015) The public sector was responsible for bus operations, the fare collection system as well as the provision of additional knowledge resources. Consulting and Engineering firms such as ICF and COWI focused on topics such as climate and flood risk management, collaborating with the Tanzania Meteorological Agency. The entire project was funded by the World Bank (Hellmuth et al., 2019).

A thesis on the “Assessment of Stakeholder Needs and SDSS Tool Application for Collaborative BRT Infrastructure Planning” made an in-depth analysis on the Dar es Salaam BRT System including the involved entities in this cross-sector public-private partnership and depicted the findings in a diagram.

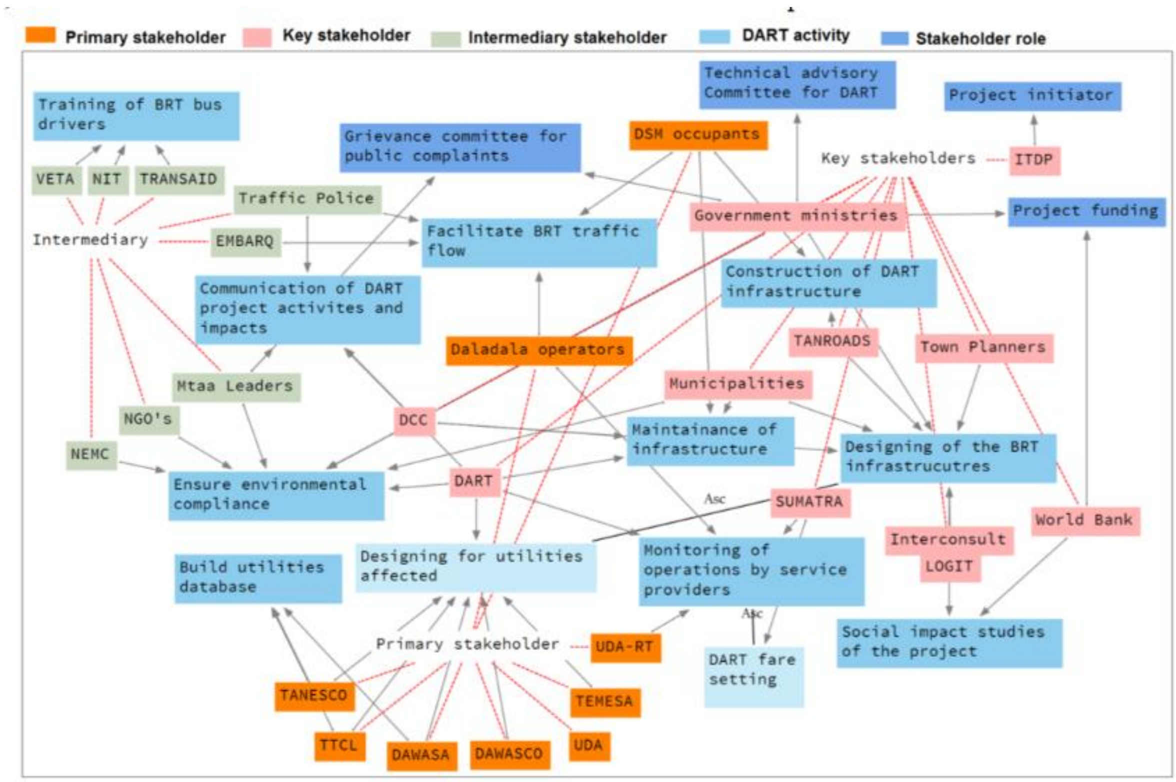


Figure 7 Dar es Salaam Bus Rapid Transit Stakeholders and roles (Oneko, 2017)

Figure 7 shows the complexity of the partnership largely due to the scale of reach of the project in different aspects of the society.

<u>Case Study Conclusion</u>

Although met with a significant amount of scepticism due to the duration of the project period as well as the surpassing of the budget, the PPP goal was finally accomplished. It provided mobility for an estimated 1.2 million people, reduced congestion by up to 30%, reduced travel time by half and lowered the amount of vehicle emissions and accidents by 20% and 15% respectively (SMEC, 2023).

Case Study 3: Kiira Motors

This case study relates to an e-mobility PPP in East Africa and unlike the previous two case study examples, it is not bound to a specific project. What started as a research project at the Makerere University in Kampala, Uganda in 2007 became an example of a successful PPP initiative in East Africa. Kiira Motor Corporation was founded in 2011 with 96% being owned by the Uganda government and 4% by the Makerere University (World Resources Institute, Shell Foundation and Cities and Infrastructure for Growth (CIG) Uganda, 2021). Kiira was one of the pioneers on the African continent in building long distance electric buses and they also produce a limited number of electric vehicles (Owino, 2023).

Through funding Kiira Motors, the government shows their commitment to e-mobility increase in the country and the Makerere University can continue to be involved in supporting technical advancement (TUMI E-Bus Mission, 2022). Currently, Kiira Motors has partnered with Tondeka Metro Company, a private transport company contracted by the government to provide mass transit services to the Greater Kampala Metropolitan Area (Muhoozi, 2022). Through these partnerships, the pooling of resources is possible as the different aspects of funding, technical knowhow and service provision can be addressed by most suitable entity and an effective uptake of the e-mobility solution is possible.

3.3.3. Technology companies and government collaboration

Within the last few years, digital infrastructure has been playing a larger role in enabling access to affordable services in developing countries. Basic services such as energy provision, transportation as well as water and waste management are enabled through digital solutions as well as the respective innovative partnerships (Njoroge and White, 2023). For example, when looking at transportation, the rise in digitalisation offers options for mobile money payment permitting easier payment for services. GIS tracking and data analysis improve traffic flows and recognise key locations for increasing urban transport services (Jia et al., 2022) . In these areas, the opportunity for collaborations with the government and other entities exist. Through the sharing of data systems with the public and transport planners, transportation services can be optimised and using acquired data infrastructure can be designed, developed and integrated into urban planning processes.

Also considering the introduction of e-mobility services, knowing which locations and routes would be the optimal for public transport innovations and where charging infrastructure should be constructed, can all be monitored through digital solutions. Additionally, platforms such as for the ride-hailing services: Uber, Bolt and Safe Boda are on the rise and are based on business models that facilitate the digital exchange between independent groups for enabling transport service provision. Due to the overall younger tech savvy population on the African continent as well as an increase in the availability of internet and smart phones, the potential offered by tech companies is large and governments would be ill-advised to not take advantage of this situation (Agora Verkehrswende and GIZ, 2023; Njoroge and White, 2023). The governments can also offer support by creating policy that creates favourable environments for tech companies and investors (Tafese, 2022).

The digital rise in the African economy correlates to a boom in tech start-ups on the continent (Tafese, 2022). These tech companies collaborate with governments in public-private partnerships. Examples of these can be seen in the city of Kigali partnering with AC Group for the digitalisation of public transport systems payments (Njoroge and White, 2023). A similar operation failed in Kenya as there was little dialogue among the different stakeholders leading to a lack of uniformity. Additionally, most of the public transport systems were privately owned and operators were not interested in having less flexibility to increase prices as they pleased (Njoroge and White, 2023). Nevertheless, partnerships between tech companies and other private companies, for example other transport providers, is not unusual and can also be highly successful. The partnership between the energy and e-motorcycle company in Rwanda Ampersand and the asset financing platform Bboxx is an example of such a strategic partnership that enables the provision of e-motorcycles to the Rwandan population (Kuhudzai, 2022a).

Digital solutions being offered by tech companies help to leapfrog certain stages of development and significantly reduce costs through optimised processes (Agora Verkehrswende and GIZ, 2023). Especially when considering innovations such as e-mobility solutions being introduced into the developing country context, the inclusion of tech companies in various partnerships could prove to be highly beneficial to infrastructure and mobility planning and uptake.

3.3.4. Current Partnership Trends in the E-Mobility Sector in East Africa

When considering e-mobility implementation in East Africa, several other partnerships play a significant role in enabling e-mobility uptake. This section will list a few examples of other current e-mobility partnership trends in East Africa to eventually be able to conclude whether the PPP approach could be effective as well as to determine for which actions PPPs might be most suitable and in which not.

Although still relatively new to the continent, the e-mobility sector in Africa is continuously growing. The number of start-ups in the sector has more than tripled to over 100 in 2022 compared to the 2019 situation, more than half of which are in the two-wheeler sector (Warren, 2023). Recent years have also shown an increasing number of partnerships in the sector. Although this paper intends to highlight what role PPPs can play, the overview in table 5 will sample the different kinds of partnerships currently present and relevant relating to e-mobility uptake in East Africa, although some partnerships apply to the continent at large.

Table 5 Examples of other Relevant Partnerships in E-Mobility Uptake in East Africa (referencing in text)

Name of Organisation	Type of Partnership	Activities / Initiatives
Association for Electric Mobility and Development in Africa (AEMDA)	Network-based, Cross-sector	• Platform to support the different interests of stakeholders to enable the fast transition to low-carbon transport options • Formed working groups to tackle several main aspects of e-mobility planning and implementation including the charging infrastructure, battery storage and policy and regulations • Platform allows for visibility and networking as well as access to

		resources, financing institutions and the opportunity to contribute to local and regional policy recommendations (AEMDA, 2023)
Africa E-Mobility Alliance	Network-based, Cross-sector	• Connects stakeholders across Africa • Drives awareness, advocacy, activates markets (AfEMA, 2023)
UNEP's Electric Mobility Programme	Network-based, Cross-sector (international organisations, private sector, finance, academia)	• Supports 17 African countries in different capacities • Introducing 2 & 3 wheelers • Baseline setting and policy development • Introducing soot-free urban bus fleet (UNEP, 2018)
Consumer financing companies: **M-KOPA, Watu, Tugende, Bboxx**	Public-public	• Partner with e-mobility providers to offer individual end-consumer financing for the vehicles • e.g. Watu financing Ampersand e-motorcycles in Kenya (Watu Africa, 2023; Power Africa, 2023)
Financial Institutions: **KCB and Family Bank**	Public-public	• Partner with e-mobility start-ups to provide financing for public service providers • e.g. KCB and Family Bank partnering with BasiGo e-mobilty start up to finance BasiGo e-buses for public transport operators (Kuhudzai, 2022b; Kuhudzai, 2022c; Power Africa, 2023)
E-Motion	Private-academia (public)	• Partnership between an automobile industry player, a solar industry player and a technical colleague to provide experience, research and practical skills training • Retrofitting cars, buses, tuk tuks and providing charging infrastructure to

		public and private sector players in Tanzania (E-Motion, 2023)
Global Green Growth Institute and the Government of Rwanda	Multilateral - Public	• Supporting Rwanda's development • Green growth planning and framework development • Access to investments • Knowledge exchange • Project implementation (GGGI, 2023)

As can be seen in the table above, several of the partnerships are formed around sharing knowledge, bringing relevant stakeholders into one space and having a unified voice in policy advocacy. Several other partnerships tackle the issues of high upfront costs of e-mobility by offering financing options. Having partnerships between charging infrastructure operators, vehicles providers, asset/consumer financing companies as well as collaboration with the public sector in clear-structured supporting framework could accelerate vehicle uptake in East African markets (Renewables Academy and Renewable Energy and Energy Efficient Partnership, 2023).

3.3.5. Barriers and Challenges

The number of PPPs in African countries is still relatively low compared to other continents (Dykes and Jones, 2016). To understand why and what kind of environment is necessary for PPPs to succeed, the next section will look into some of the main challenges and risks for PPP stakeholders when looking to collaborate. Although certain East African countries have made strides in some of these topics, there are overall still challenges within the region.

Despite their benefit and increasing interest in their application, implementing PPPs is risky and bares a number of challenges. Table 6 shows some of the research that has been done on this topic.

Table 6 Current literature on challenges and risks of PPPs in (East) Africa

Source	Topics Highlighted
Bagenda and Ndevu, 2023	Major risks of PPPs in Uganda
Omwenga and Nasieku, 2016	Risks of PPPs in Kenya and management mechanisms
UNECA, 2021	Fiscal risks of PPPs in Africa as well as mitigation strategies
Tshombe et al., 2020	Challenges with PPPs implementation in Africa

When considering some of the biggest challenges with PPP implementation on the African continent and therefore the cause of several risks, poor framework is recurring problem (Tshombe et al., 2020). While different countries boast different challenges, this section will investigate the common challenges occurring with regards to PPP implementation on the African continent. In the data collection section, these challenges will be explored in the East African context to discover to what extent these could form barriers or hinderances when considering to what extent PPPs can be of use in e-mobility implementation.

Inadequate Framework

According to The World Bank (2010), in many cases there is no structure on how to resolve any legal disputes that could occur within the PPP procedure, and while some work has been done in Africa in making certain institutional changes as well as in the development of policy and legislative procedures, regulatory framework developments are relatively weak (Dykes and Jones, 2016). When setting up framework, effort needs to be placed on linking it to the national development strategy of the respective countries (World Bank, 2022a).

Significant expertise combined with informed decisions is required for establishing and implementing the necessary framework to ensure that countries are ready for infrastructure investment. Both of these are often lacking in African government institutions (The World Bank, 2022b). Although framework surrounding PPPs is still generally weak in African countries, a number of legal and institutional framework for PPPs have been developed in East Africa. The African Legal Support Facility in collaboration with the World Bank's PPP data base have created country profiles on the PPP climate in various countries, including stating any applicable framework, whether a PPP Unit exists as well as some examples of PPP projects in the countries. Table 7 below summarises the main findings with regards to PPP Law:

Table 7 PPP Legal and Institutional Framework in East Africa (ALSF, 2017a; 2017b; 2021; 2022)

Kenya

PPP Law and other applicable texts

- Public Private Partnership Act, 2021 (PPPA)
- Public Private Partnerships (Amendment) Bill, 2018
- Public Private Partnership Regulations, 2014
- Policy Statement on Public Private Partnerships, 2011
- The Privatization Act, 2005
- The Public Roads Toll Act Cap.407
- The Public Procurement and Disposal Act, 2005

Tanzania

PPP Law and other applicable texts

- The Public Private Partnership Act (Amended), 12 May 2014 (as PPP Act)
- The Public Private Partnership Regulations (Amended), 27 November 2015 (as PPP Regulations)
- Public Procurement Act, 2011, amended in 2014
- National Public-Private Partnership Policy, 2009

Uganda

PPP Law

- The Public Private Partnerships Act, 2015 (PPP Act)
- The Public Private Partnerships Framework Policy, 2010 (PPPFP)

Rwanda

PPP Law

- Law No14/2016 of 2 May 2016 for Governing PPPs in Rwanda (LPPP)
- PPP Guidelines, 2018 (the "Guidelines")
- Rwanda Vision 2020
- Rwanda Vision 2050
- Law N°62/2018 Of 25/08/2018 Governing Public Procurement

Despite the available PPP Laws and other applicable documents in East Africa, poor management and the lack of an implementation strategy still leads to regulatory challenges within the governments.

Institutional Competence and Capacity

Institutional competence and capacity plays an important part in how infrastructure providers perform. Studies have revealed a strong linkage between how established governance is in a specific sector e.g. infrastructure, and the quantity and quality of infrastructure services provided. On average, infrastructure related governance in African countries is relatively underdeveloped (The World Bank, 2010). Issues such as corruption are products of weak government and can have detrimental effects on private sector investment. Unfortunately, several African countries are flooded with corruption and often rank high on the list of the most corrupt in the world (see Annex 2) (Dykes and Jones, 2016). Typical outcomes of corruption would be a government which either completely neglects or reverts upon project guarantees that were given. This lack of transparency significantly increases the risk factor and turns away investors (Sharma, 2012). Lack of adequate communication lines from a physical and organisational standpoint as well as the lack of skills in developing and structuring PPPs adds to the insecurity of private investors (Dykes and Jones, 2016).

Macroeconomic Situation

Unstable macro-economic environments increase the commercial risks for private companies and decrease their chance of generating profits. Especially when considering infrastructure projects which generally require a longer period of time for return of investments, considering the macroeconomic stability of a country is a given for private sector investment (Sharma, 2012). Among the macroeconomic factors considered are indicators such as GDP, inflation, market size, purchasing power/income per capita, total debt and foreign direct investment (FDI) inflow, some of the values of which correlate positively and others negatively to infrastructure investments (Yurdakul, Kamaşak and Yazar Öztürk, 2022). Lack of foreign exchange stability is one of the main economic barriers for investors looking to invest into PPPs in African countries (Dykes and Jones, 2016).

Political Environment

The regulatory framework depends on the political environment. However, due to the significance of this point, it will also be discussed separately. The political environment of a country is an important factor considered by private sector investors when looking to establish a PPP in a country. In some instances, governments make choices and take risks based on their political agenda as opposed to what would actually be in the best interest of the public (Hammami, Ruhashyankiko and Yehoue, 2006). In addition, whether or not regulatory framework exists, political leadership can decide to completely override any form of regulation, tariff agreements and service conditions for the involved private party, which further highlights the importance of political stability (Sharma, 2012).

Societal Barriers

PPP formation can be met by significant resistance from the public. Often, this is due to a lack of understanding or misunderstandings but in many cases it still stems from fears of post-colonial societies that do not want to, in their eyes, relinquish control of their countries once again. This is specifically the case when the private investment comes from Europe as many African countries were under the colonial rule of European countries (Dykes and Jones, 2016).

3.3.6. Summary

As mentioned in the introductory sections, partnerships and collaborations can aid in service provision through pooling resources and taking advantage of the strengths of different partners. Looking at the e-mobility uptake in East Africa, several partnerships are already playing a role. Sections 3.3.3. and 3.3.4. allow for the second sub-research question to be addressed:

Sub-Research Question 2: What is the current landscape of e-mobility planning in East Africa, is there an openness for PPPs?

Through the literature review, the current landscape of e-mobility planning was examined. The openness for PPPs will be accessed through expert interviews in the data collection.
In many cases, network-based partnerships organised by international and multilateral organisations give a platform for different stakeholders to interact, share experiences and gain knowledge e.g. on financing possibilities. They also provide these stakeholders with the opportunity to share desired policy changes which can in turn be advocated for by the organising institutions to the respective governments. Especially in Africa, where e-mobility is still relatively new, such network-based partnerships give opportunities for players from different backgrounds, at different stages of development, a chance to work together and benefit from each other.

The review of current partnerships in e-mobility uptake in East Africa revealed several partnerships between financing institutions and e-mobility providers. Whether looking at individual end-users or public transport providers in cities, switching to EVs, although considered cheaper in the long run, bares high initial investment costs. Without the cooperation with such financiers, e-mobility would not be able to penetrate the market because of lack of affordability. Currently, examples of e-mobility public-private partnerships in East Africa was sparce and the challenges described in section 3.1.4. could be a major reason for this.

After highlighting the conceptual framework for the research in this section, the data collection chapter will analyse information from stakeholders from different sectors to examine whether, despite the barriers, there is a chance for PPPs to be effective in enabling e-mobility uptake.

3.4. Best Practices of E-mobility

This final section examines best practices of successful PPPs in e-mobility integration. Given that their e-mobility journey is more established, examples are taken from initiatives in Europe to see what lessons can be learnt from the years of experience.

In Europe, PPP initiatives in e-mobility introduction, uptake and upscaling have gained traction. Governments, businesses and organisations see the importance of collaborating to promote this sustainable transport solution in order to enhance the quality of life in cities and to make people's mobility more individual and diverse. To achieve the best results, there is a need to have close collaboration between industry, research and education, all of which is supplemented by dialogue around the best applicable policy (Bundesministerium für Wirtschaft und Technologie, Bundesministerium für Verkehr, Bau und Stadtentwicklung, Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit and Bundesministerium für Bildung und Forschung, 2011).

3.4.1. Amsterdam Electric

This city-wide project in the Netherlands' capital, Amsterdam, aimed at encouraging residents to switch to electric vehicles and to phase out all petrol and diesel powered vehicles by 2030. To support these goals, the government works with a combination of incentives as well as by partnering with private companies and organisations to create an extensive accessible network of EV charging stations (Global Resilience Institute at Northeastern University, 2019).

The partnership was a collaboration between the City of Amsterdam; one of Europe's largest energy producers and providers, Vattenfall; the grid owner, Liander; the Amsterdam University of Applied Science and Elaad, a competence centre on infrastructure.
The investments for the infrastructure came from both the City of Amsterdam as well as from Vattenfall and combined with the skills and knowledge of the other parties resulting in the creation of Flexpower Amsterdam (Francis, 2019).

This smart charging network not only enables faster charging of e-cars but also ensures that the charging is linked to optimised use of grid electricity and uses as much as possible of the respective neighbourhood's private households' renewable energies produced. Currently, there are more than 450 Flexpower charging stations and 900 Flexpower charging points in the city, accounting for roughly one third of all the EV charging infrastructure in Amsterdam (Francis, 2019).

3.4.2. ChargePlace Scotland

Initiated by the Scottish government, this public and privately funded initiative aims to provide publicly accessible EV charging infrastructure located on both public and private land. Landowners are responsible for maintenance but the Scottish Government is responsible for coordinating operations through a homogenised back office system for all charging points (Nairn, 2020). Although the initiative was successful, an increase in demand to invest in and upgrade the EV charging network led the Scottish government to doubt the sustainability of the public sector delivering this alone thereby relinquishing their role and turning over the operations to a private firm who would be able to meet the demand and climate targets. The new PPP model is a combination of an operation and management contract for existing infrastructure as well as a BOT model for the construction of new charging points (Bryce, 2023).

3.4.3. Green eMotion

Running from 2011 to 2015, Green eMotion was one of the largest European research and development projects focussing on e-mobility uptake and upscaling in Europe. This multi-lateral project saw the partnership of stakeholders from municipalities in different European cities, academia and research institutions as well as private players from industry and the energy sector (CORDIS, 2014). The aim of the project was to enable easy and comfortable movement with electric vehicles across different European countries. The 42 participating stakeholders pooled their knowledge and experiences including in information and communication technology, demonstrations and information sharing (VERBUND, 2014).

The main goal of the project was on Europe-wide standardisation with regards to e-mobility. This meant developing an adequate and user-friendly framework which considered smart charging networks, information and communication technology solutions as well as testing different EV models and other specific elements of the EVs e.g. the batteries. The project took advantage of information gained from different ongoing regional and national initiatives and combined them into international solutions (European Commission, 2011; Danish Technological Institute (DTI); 2023).

This project was considered a success and according to the Danish Technological Institute (DTI) (2023) it “demonstrated a European framework that connects all electromobility stakeholders for a seamless, cost-efficient, and interoperable electromobility ecosystem.”

3.4.4. FREVUE – Freight Electric Vehicles in Urban Europe Project

As part of a larger project testing EVs for urban logistics in eight European Cities, this project looked to examine the effect of incentives on encouraging e-mobility uptake in the context of freight vehicles in the City of Amsterdam (2Zero Emission, 2015; FREVUE, 2017). Electric delivery vehicles are more expensive that the diesel alternatives (2Zero Emission, 2015). Within the project in Amsterdam, the city administration provided traffic regulation exemptions to logistic operators also referred to as ‘privileges’ to inspire uptake despite the initially higher costs. These privileges allowed the operators access to loading and unloading zones directly on pavements which normally had prohibited parking, access to certain pedestrian areas and the opportunity to deliver outside of the normally defined delivery windows (FREVUE, 2017). Operators experienced faster deliveries as time was saved by being able to park closer and not having to walk as long to make the deliveries, less time was spent looking for parking spaces all of which led to an increased number of deliveries being carried out. Additionally, certain qualitative results were visible, such as a decrease of stress in drivers due to not having to potentially park illegally for drop offs and less mistakes due to not rushing back to a vehicle parked in a prohibited zone (FREVUE, 2017).

Overall, the project provided positive feedback as operational benefits were apparent to the operators who were able to save time and increase earnings through higher amounts of deliveries. The City of Amsterdam was pleased with the project outcomes as the study revealed that local businesses became more sensitised to the positive effects of electric vehicles on air and noise pollution reduction. At the end of the initial project period of one year, the City of Amsterdam aimed at testing the application of these incentives on a larger scale. Operators provided feedback of further strategies that could be implemented by the city to further support their business case for investing into e-mobility such as allowing EV delivery vehicles to use tram lanes and avoid congestion and expanding the applicability of exemptions to areas beyond the city centre (FREVUE, 2017).

3.4.5. Summary of Best Practices of E-mobility PPPs

The examples above show how PPPs can be used to enhance e-mobility uptake. Nevertheless, the approaches shown are different. The first two examples describe cases in which EV upscaling is enabled and encouraged through the provision of the vital charging infrastructure. The partnerships in this sense are often between the government and private companies that can construct charging infrastructure or can repair and/or maintain and/or operate it.

The third example focuses more on partnerships between the public and various institutions including private companies, universities and industry players for a more comprehensive look at the e-mobility ecosystem with skills and knowledge sharing. Such partnerships can be within a certain country or can involve cross border activities as in the Green eMotion example. The last example involves the government supporting private sector activities through incentivising. When applied on a long-term or permanent basis, these incentives could require corresponding policy and law adjustment (e.g. parking in prohibited areas) to encourage EV uptake.

3.5. Key Takeaways from Chapters 2 to 4

A number of key takeaways can be summarised from chapter 2 to 4 to address the first and the third sub-research questions.

The figure below addresses the first sub-research question about the opportunities for PPPs in e-mobility uptake in East Africa. Opportunities are found by compiling findings from section 3.1.4.: Barriers to e-mobility uptake and section 3.4 showing examples of e-mobility PPP solutions in other countries.

Sub-Research Question 1: Where are the opportunities for PPPs in e-mobility uptake?

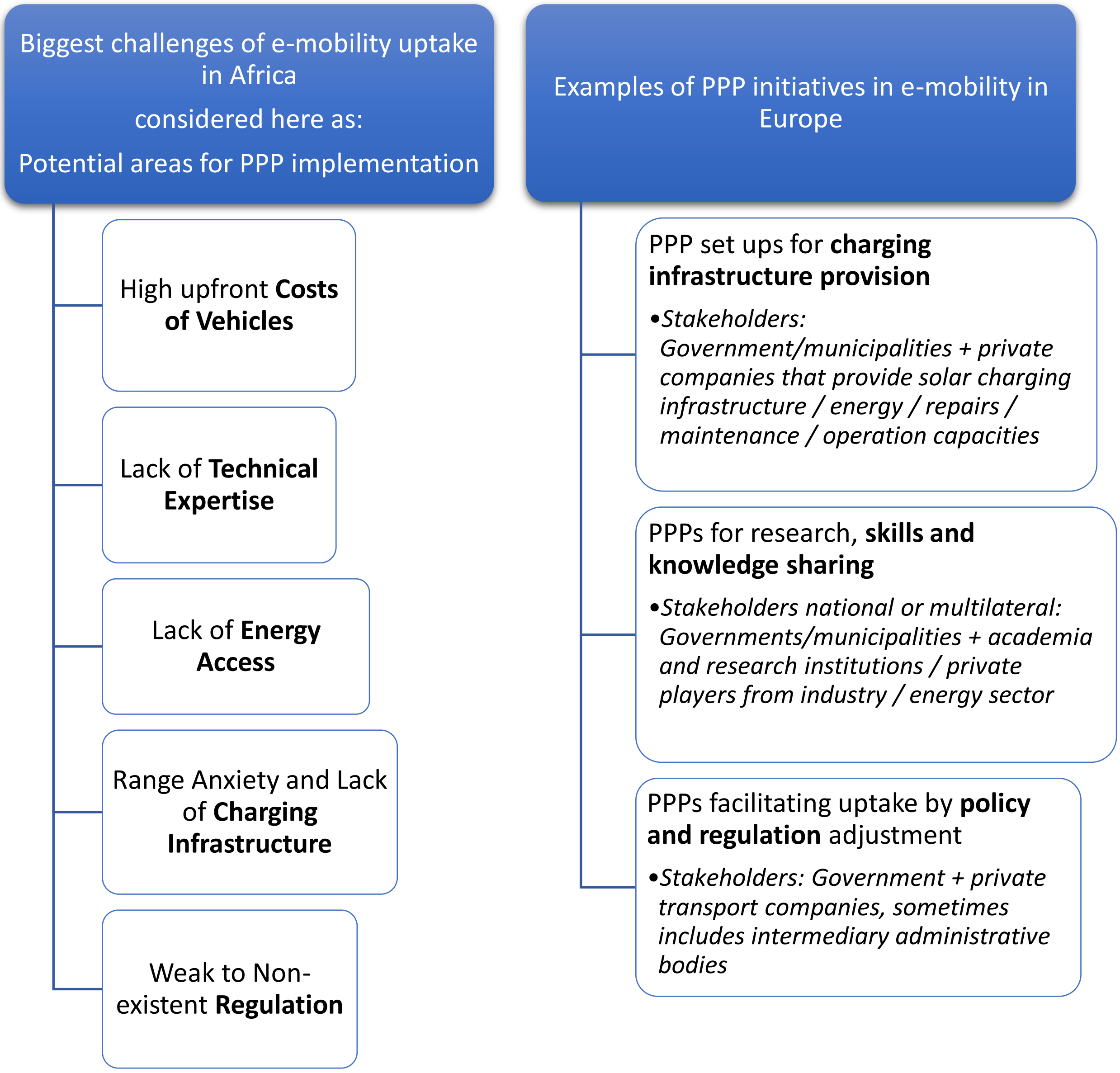


Figure 8 Opportunities for PPP application and examples of PPP structures

The third sub-research question findings are summarised in the figure below using literature review data on the main hinderances to PPPs in East Africa in section 3.3.5.

Sub-Research Question 3: What are the hinderances to PPPs in East Africa?

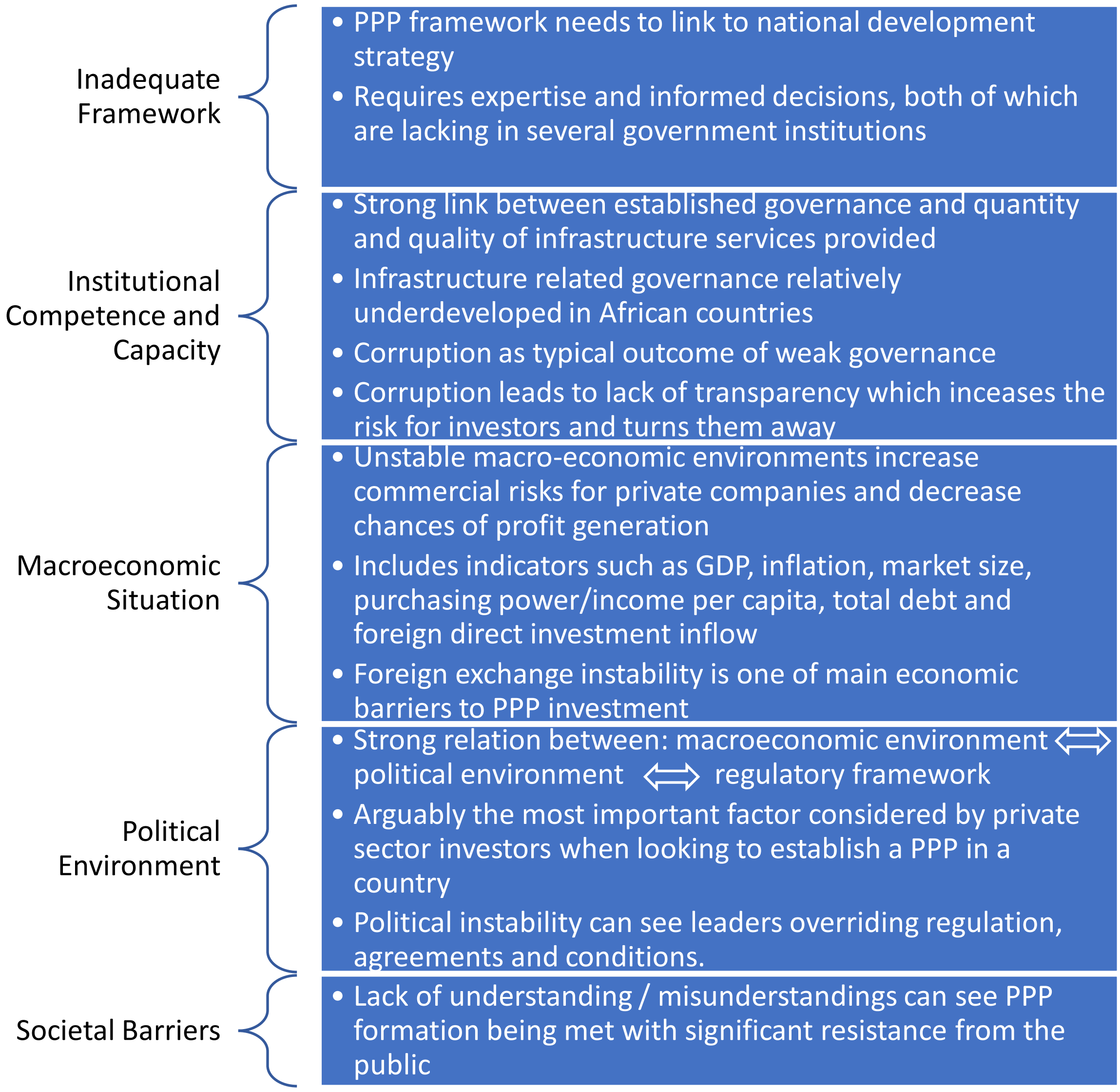


Figure 9 Hinderances of PPPs in Africa

3.6. Operationalising conceptual framework to interviews

The semi-structured interview guide used a mix of open-ended and closed questions related to the conceptual framework. To complement literature research on the biggest challenges of e-mobility with empirical findings, and open-ended question was asked to interview experts on what they perceived to be the biggest challenges. This allowed for contextualising to East Africa, for links to the literature review to be determined and also left the opportunity for new previously unmentioned problems to be introduced. A brief assessment of the barriers of e-mobility uptake presents the areas for potential implementation of PPPs to ease/remove some of these barriers.

A similar approach is taken for the introduction of the topic of PPPs, as opposed to starting by stating the benefits of PPPs, interviewees are asked for their perception on the topic. Initial questions on PPPs asked are general to evaluate if the perception of PPPs matched the framework as to why entities go into PPPs.

Some examples of PPPs mentioned in section 3.4. are presented to interviewees to assess to what extent current international strategies are applicable to the local context. Both of the chosen examples of PPPs applications in the interviews relate to some of the barriers to e-mobility uptake found in the literature review, namely: lack of charging infrastructure and high upfront costs.

Topics of governance and ecological modernisation are operationalised in interviews through discussing which different players are involved in e-mobility uptake, the necessity to collaborate and what the roles of the different sector players are as well as the role of the government. The idea of smart regulation and the creation of an environment that steers change from ecological modernisation is discussed through the topics of incentivising and whether financial and non-financial incentives are effective methods to enable e-mobility uptake.

Requesting interviewees to present barriers to collaborating with the government attempts to investigate if there is a link between their presented barriers and the section 3.3.5. 'hinderances to PPPs in East Africa' discovered through the literature review.

In this final section, interviewees will be able to give their opinion on whether PPPs or partnerships in general are the right approach to tackle the biggest barriers to e-mobility implementation in East Africa and enable more efficient uptake. This once again ties in to the overall conceptual framework on partnerships to see if the perceived benefits outweigh the perceived barriers.

4. Research Methodology

In this chapter, research methods and techniques will be described. The research procedure follows three main stages: the preparatory phase, data collection and data interpretation. As the research limitations have already been included in the introduction section, they will not be included in this chapter.

This research paper involves two different fields of study: e-mobility and public-private partnerships and attempts to find common ground between the two in the East African setting. As a result, the different stages of the research encompass that similar format. The purpose of this research is to explore the potential impact of PPPs on e-mobility uptake in the East African context. The choice of exploring the potential role of PPPs stemmed from an empirical interest in the topic by the author. The development of the research design involved used a deductive approach. A deductive approach to a research topic uses "predetermined theory or theoretical framework, to find examples of constructs and support or challenge them" (Young et al., 2019). In this paper, research is based on the conceptual framework of PPPs as well as their successful application in e-mobility in Europe, the new research examines whether these principles can be applied to the particular case of e-mobility uptake in East Africa.

4.1. Preparatory Phase

The preparatory phase involves a review of current literature and the formation of conceptual framework with regards to e-mobility in East Africa, PPPs in East Africa as well as PPPs in e-mobility in East Africa. Reviewing the different aspects mentioned above enables the development of theory as well as identification of gaps in current research. The review of available information encompasses looking through a broad range of sources including relevant academic journals, websites, reports and newspaper / press articles. Due to the relative recency of the topic of e-mobility in (East) Africa, where extensive scientific research might not yet be comprehensive, it was important to supplement scientific papers with newer sources such as newspaper articles.

It is intended that the review of a mixed kind of literature, documents, articles and websites, provides different perspectives, opinions and first hand findings in addition to the primary research studies from which a number of the defined sub-research questions can be addressed. The aim of the literature review is not to review all published information with regards to the fields of study mentioned above, but intends instead to combine standpoints leading to the creation of a new perspective: *can PPPs be an effective approach to e-mobility uptake in East Africa?* As a result, an integrative review approach is chosen rather than a purely systematic approach (Snyder, 2019).

The following key words were used in search engines such as google Science Direct, Google Scholar and ResearchGate as well as the Aalborg University's library portal: "e-mobility Africa", "e-mobility East Africa", "PPPs East Africa", "PPPs e-mobility", "PPPs sustainable transport", "PPPs e-mobility East Africa". For topics on e-mobility, generally recent literature is chosen. For topics relating to PPPs, a mix of newer and older literature is chosen as some topics, such as the history of PPPs and the establishment of certain theory, requires looking into older documents. The documents were structured in themes, namely: e-mobility in Africa, policy and governance, partnerships and PPP.

4.2. Data Collection

4.2.1. Choosing of the Participants / Sampling Technique

To supplement information gathered through the review of relevant literature and documents, data collection was performed using a qualitative method by means of interviews. According to Bryman and Bell (2011, p. 411) quoted in Azungah (2018) using a qualitative approach highlights "contextual understanding". It is often used to understand "behaviour, values, beliefs, and so on in terms of the context in which the research is conducted". For this research, the conceptual theory of PPPs is applied to the East African setting, the acceptance and applicability of which is investigated through interviews. Findings from the literature review motivated the selection of experts for this research through highlighting the different players involved in e-mobility uptake. Additionally, the literature reviewed presented the roles of the public sector in PPPs, PPP benefits but also complexity, as well as some of the stakeholder perceived barriers to implementation in Africa. These findings emphasised the importance of acquiring the perceptions from different sector representatives in the researched region.

The interviews are conducted with different sector stakeholders chosen through purposive sampling. Purposive sampling is used to ensure that specific cases (in this case: sector representatives) are be included in the research sample as these different sectors may have different and important views with regards to the topic at hand (Campbell et al., 2020). Using this sampling technique aims at achieving relevant, useful and credible information (Kelly, 2010 quoted in Campbell et al., 2020). They were targeted for the interview and identified as experts due to their firsthand relevant experience, observations and/or knowledge relating to the research topic. The initial identification of expert stakeholders occurred between April and June 2023, with further potential participants from the field being identified through snowball sampling. Snowball sampling defines a recruitment strategy where participants who are asked to provide information, in this case through interviews, are not directly sourced and recruited by the researcher but rather through a referral from previously identified participants (Marcus et al., 2016).

The chosen stakeholders come from diverse research topic relevant backgrounds including as current or former NGO representatives, public sector employees and private sector company owners. Interviewees were chosen on the premises of at least one of the following criteria:

- Their involvement / extensive knowledge in e-mobility (infrastructure) introduction in one of the East African countries being researched in this paper or
- Their involvement / extensive knowledge in transport (infrastructure) planning and the potentially relevant collaborations in the same aforementioned East African setting.

Given the nature of this research topic, being able to understand the feasibility of PPPs as an option for enhancing e-mobility uptake includes assessing whether actors of different sectors would be interested in collaborating with the respective other sector. The qualitative research approach used has the distinct feature of allowing for potential opportunities and barriers -in this instance of PPPs- from the view point of that specific sector representative to be acquired (Hennink, Hutter and Bailey, 2020). According to Birkinshaw et al. (2011, p.573) cited in

Azungah (2018) qualitative research is key in understanding "the complex plurality of contexts". For this research, qualitative data is collected by means of in-depth interviews. In-depth interviews have the goal of acquiring information on the topic of research and diving deeper into conversations with participants. As opposed to a 'questions and answer' approach, in-depth interviews allow for a looser structure where the target is the retrieval of certain information without the need for identical formulation of questions or ordering of questions (Maison, 2018). All data collected from the interviews is reported anonymously, to enable free and open speech of all participants.
Table 8 shows interviewed expert stakeholders and the basis of their selection.

Table 8 Interview ID, sector and country on the ten interview participants

Interview ID	Sector	Country	Interview date
IPNP1	Private non-profit (local NGO)	Uganda	17.10.2023
IPFP1	Private for-profit	Uganda	18.10.2023
IPNP2	Private non-profit	Rwanda	20.10.2023
IPFP2	Private for-profit	Rwanda	20.10.2023
IP1	Public	Uganda	24.10.2023
IP2	Public	Tanzania	25.10.2023
IPNP3	Private non-profit (Multi-lateral)	Tanzania	25.10.2023
IPFP3	Private for-profit	Uganda	26.10.2023
IPNP4	Private non-profit (Multi-lateral)	Kenya	30.10.2023
IPFP4	Private for-profit	Tanzania	01.11.2023

The private for-profit sector representatives came from the e-bike, e-motorcycle, e-tuk tuk and e-car branches. Given that some of the countries researched have very few players active in the e-mobility market, no further clarification will be given as to which branch representative came from which country in order to retain anonymity.

4.2.2. Interview structure

The video interviews are steered by a semi-structured interview guide. The semi-structured interview guide contained a mix of closed and open-ended questions and it was designed to operationalise concepts by reflecting the conceptual framework and the research questions. The duration of the interviews ranges from 30 to 50 minutes and documentation is done by recording and field notes. After a brief introduction of the interview background and interview procedure, the interview begins with general opening questions such as asking interviewees to share information about their background in the respective (research paper relevant) sector. Opening questions are aimed at building rapport and making interviewees comfortable before starting with the key topics (Hennink, Hutter and Bailey, 2020). After the opening questions, key questions are used to extract the core information of the interviews.

Due to newness of topic, not only of e-mobility in East Africa but specifically on its combination with PPPs, an exploratory research approach is enabled through the qualitative interviews. According to Babbie (2007) an exploratory research approach is often the best approach for studies on relatively new topics. The exploratory approach allows for the production of new questions (Casula, Rangarajan and Shields, 2020). In this paper, while the main research question examines the effectiveness of PPPs, the exploratory approach allows for the development of further questions such as 'if not PPPs, which other collaborations could be effective' or ' are collaborations the right approach for e-mobility adoption in general'.

The key questions were divided into four main sections and the questions were organised in a logical order. However, as indicated above, due to the in-depth interview method, the exact questions asked and the exact order is customised to each interview depending on interviewee's answers to maintain the natural progression of the interview. Therefore, the interview guide was rather used as a checklist to ensure that key topics are addressed. In addition to the interview questions, probes were used. Robinson (2023) defines probes as "verbal prompts to clarify, elaborate, illustrate or explain a prior answer to an interview question that the participant has already given". When correctly applied, probes can motivate participants and enrich the quality of data retrieved from interviews by getting interviewees to elaborate on interview questions (Robinson, 2023). The main probes used were for encouragement e.g. saying "*really?*" when participants stated something, increasing motivation and encouraging them to say more and for elaboration e.g. "*you mentioned authorities work in a vacuum, can you tell me more about that?"*.

Given that some participants were more versed in some topics of the interview and less in others e.g. more experience with e-mobility introduction but less experience in PPPs, in some instances, the terminology 'public-private partnership' is not regularly repeated but rather colloquialised by replacement with terms such as 'collaboration with the government / private sector' to make the context more understandable.

After the main section of the interview, broader closing questions are asked, namely: "*To wrap it up – do you feel like we have left out anything important related to this topic, or do you have anything else you would like to add?*". These closing questions give interviewees the opportunity to bring in new insights that might have not been initially considered or to simply to highlight points that they feel were the most important during the interview.

4.3. Data analysis

Unlike in quantitative research where data analysis only occurs after all of the data has been collected, the qualitative research approach of this study allowed preliminary data analysis to begin from the point of data collection. This preliminary analysis permitted the interview guide questions to be adjusted if necessary and for the potential inclusion of important topics not initially taken into account, thereby supporting the exploratory research approach (Weckesser and Denny, 2022).

According to Elo and Kyngäs (2008), a deductive method of data analysis is used when the analysis is structured based upon prior attained knowledge and theory. It is considered a suitable approach to analyse the proven theories in different situations and contexts. Using the deductive research method to define the research procedure and collecting data in a qualitative exploratory process allows the data analysis process to verify whether the result will support the previous theories or whether new theories will be created from the collected data.

After the preliminary analysis during the data collection process, data is coded (see examples in summary below) using a blended approach of deductive and inductive coding (Graebner et al., 2012 cited in Skjott Linneberg and Korsgaard, 2019). While the deductive approach initially provides theoretical relevance with a preliminary thematic structure, the inductive coding allows for closer examination of the differences within each interviewee's perception and stance by establishing codes directly from the data (see examples in summary below) (Skjott Linneberg and Korsgaard, 2019). The coding allows for patterns to be detected that are used in data interpretation before eventually grounding the results to theory.

To summarise, data will be analysed in the following manner:

i. Preliminary data analysis, use of field notes
ii. Thematic categorisation following prior theory

Initial coding was in line with the categories of the semi-structured interview guide shown in annex 1. Namely, topics were categories into the themes: challenges of e-mobility uptake, the role of the government, other relevant players in enabling e-mobility uptake, openness to PPPs, preferred PPP structure, barriers to PPPs and overall effectiveness of PPPs for e-mobility implementation.

iii. Inductive coding for closer examination within initial categories

During the data analysis, inductive coding was developed from terms used by the participants e.g. while defining the preferred PPP structure and the role of the government was described as to create an "enabling environment". Another example was the use of the term "nervousness around the topic" as a barrier to e-mobility uptake and a reason for awareness raising strategies.

iv. Formation of new (sub-) categories as basis of grounded theory

Findings from the interviews led to the formation of new themes for discussion during the analysis process. An example of such a newly developed theme was the idea on whether collaboration with the government is an option vs a necessity.

4.4. Reflection on methodological approach

As mentioned at the beginning of section 4, the choice of research topic came from an empirical interest from the author due to working in the e-mobility field from the perspective of an NGO. Realising the difficulty of introducing an innovation such as e-mobility into a new environment let to the thought on what can simplify this process. Given the research topic, the chosen deductive research approach was considered as the most applicable approach due to prior existing knowledge of the use of PPPs in transportation. Combining this with a qualitative exploratory data collection allowed for flexibility in applying the conceptual framework, but allowing for different contextual perspectives to be highlighted. Given that four countries were examined in this research, the use of qualitative in-depth interviews allowed for a lot of data to be collected in an efficient manner. Choosing experts currently working in a relevant field meant that the information divulged was not only 'hear say', but involved own experiences. Additionally, working with multi-lateral participants enable broad objective views due to the nature of their work with both the public and private sectors.

There was a necessity to be aware of cultural differences throughout the interview process. Coming from a European working space, it was important to use European examples with caution and acknowledge different contexts and potentially different applicability. Cultural differences were also noticeable through the interview processes were certain participants sat slouched and appeared to be disinterested or lose focus. In the end, all questions could be addressed, but the interviewer had to be aware of keeping motivated to proceed in the data collection. An advantage for the interviewer was coming from a background of having worked in the East African environment, meaning an extent of cultural awareness was already present.

A limitation of the data collection was the country distribution of interview participants, 4 were from Uganda, 3 from Tanzania, 2 from Rwanda and 1 from Kenya. Initial focus was on ensuring that all sectors were represented as well as at least one representative from each country was represented. Future similar research topics could try and attain a more balanced distribution of representatives per country. A positive aspect was the representation of different sector branches in the interviewed private sector companies. Given the diverse nature of e-mobility, problems perceived by one branch may be irrelevant for another. Therefore the representation of different branches (e-bike, e-motorcycle, e-tuk tuk and e-car) allowed for a more comprehensive analysis.

Recommendations for future research on the topic would be to focus on its applicability within one country to enable a deeper understanding of the topic. Given the complexity and plurality of introducing e-mobility, as well as the different sector and country dependant variables relevant for its uptake and for establishing PPPs, the research topic was broad. This meant that an overall general assessment of the topic and factors contributing to it could be established which would need further development before becoming something that can be operationalised in specific countries.

5. Empirical Findings

According to Skjott (2019, p. 267) "findings in qualitative research should always emphasize elaborate detailed descriptions, specific examples and the inclusion and discussion of outliers rather than count instances of a phenomenon." Largely in line with Skjott's statement, this section will discuss the empirical findings from the data collection process. While certain information will be displayed in a grouped manner to enable the forming of partners and a conclusion, focus will be placed on highlighting any noteworthy single situations and feedback.

After brief introductions to the research topic and to the interviewee's background, the in-depth interviews led by the semi-structure guide commenced. All four researched countries were represented in the interviews and stakeholders from the public, private for-profit and private non-profit sectors were spoken to, as shown in table 8 in the methodology.

The purpose of the expert interviews was to verify the conceptual framework on why entities go into PPPs, the potential benefits to be gained as well as if they would be an effective strategy for e-mobility introduction and fostering in East Africa. When discussing the topic of PPPs, a significant aspect is the openness to collaborate with the respective other sector as well as understanding why that openness or lack thereof might exist. Whether or not PPPs are considered as a good strategy, other important partners for the uptake of e-mobility are highlighted as well as the roles of the different sector players.

Following a similar structure to the overall paper as well as the sub-research questions, the biggest hurdles of e-mobility uptake in the respective East African countries were discussed first (sub-research question 1), as a basis of understanding where PPPs -or other collaborations- might come in useful. Thereafter, the current landscape of e-mobility planning will be accessed including the role of the government, the main other sector players involved and the openness to collaboration between the public and private sectors (sub-research question 2). Where openness for PPPs exists, the preferred structure will be highlighted followed by the main perceived obstacles of collaboration between the public and private sectors (sub-research question 3). Finally, other important collaborations for enabling e-mobility uptake will be presented while accessing the overall effectiveness of PPPs as a strategy (sub-research question 4).

5.1. Current Position of E-Mobility Uptake

5.1.1. Biggest challenges to e-mobility uptake and planning in the respective countries

For most interviewees, no weighting was given to the problems. All of the problems were considered to be significant and to impact e-mobility uptake in their country. Additionally, some of the challenges are interlinked or impact the existence of others, as shown in figure 10, further complicating the idea of allocating a weight. As a result, each aspect is given the same weight and the challenges with the highest values are those that were mentioned the most times when this question was asked.

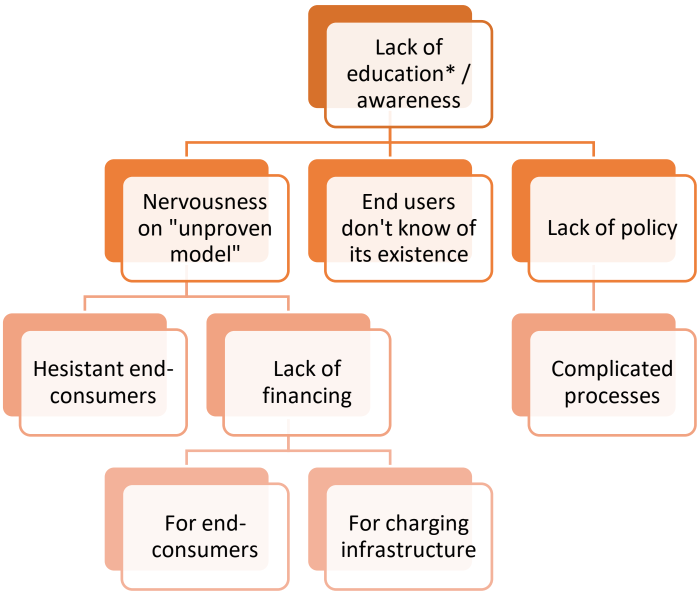


Figure 10 Causal relationship between some of the challenges of e-mobility uptake in East Africa

**does not refer to a lack of technical skills*

Of the ten interviewees, eight responded to the question "What are the biggest barriers of e-mobility uptake in your country?" The interviewed public sector representatives did not respond to this question due to the fact that they are not currently active in the e-mobility sector. Figure 11 shows the responses from the private sector representatives. Of the eight respondents, four are from the private for-profit sector and four from the private non-profit sector.

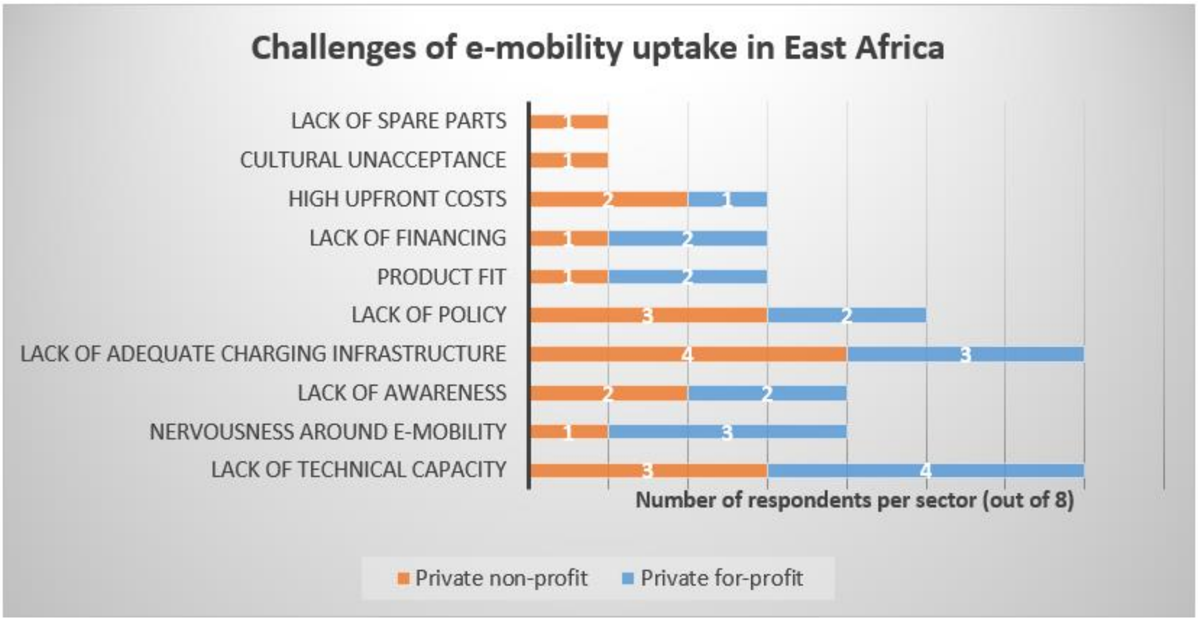


Figure 11 Challenges of e-mobility uptake in East Africa from perspective of private sector representatives

Reflection on the perceived biggest challenges to e-mobility uptake

As seen in figure 11, a lack of technical skills and a lack of adequate charging infrastructure were perceived as the biggest hinderances to uptake. More than half of the respondents also perceived the lack of policy, lack of awareness and the thereof resulting nervousness around e-mobility as having significant impacts on the uptake. When considering the distribution of the challenges among the investigated countries illustrated in figure 12, a lack of charging infrastructure and lack of awareness were problems perceived by the interviewed stakeholders in all four countries.

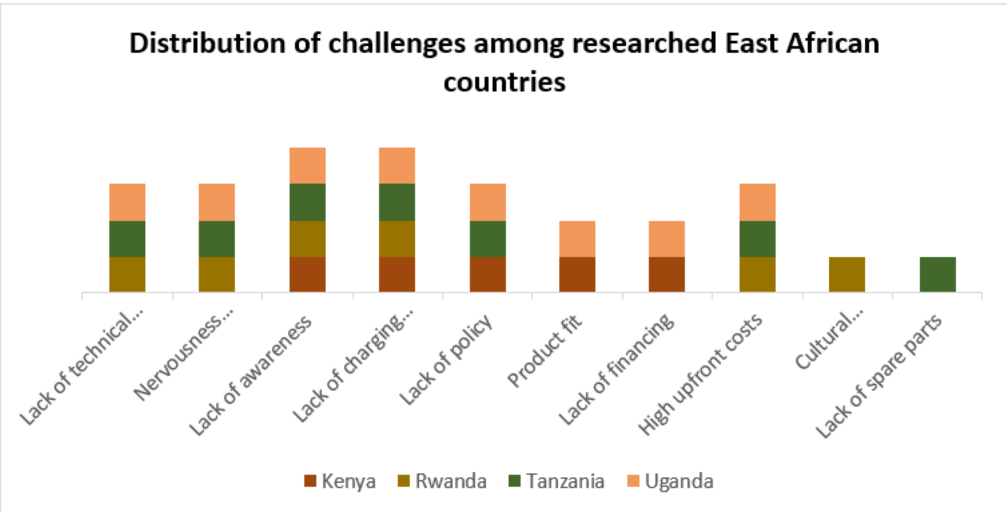


Figure 12 Perceived occurrence of challenges to e-mobility uptake in the investigated East African countries

Lack of charging infrastructure

One of the most often mentioned barriers across the sectors and countries, a lack of charging infrastructure greatly influences the e-mobility uptake in a region. IPFP1 calls it a "*generic challenge"* stating that it is not only an East African problem, but one that exists in any market looking to introduce e-mobility. A lack of charging infrastructure can affect all EV users depending on the use case. According to IPFP1, IPNP3 and IPNP4 an e-bike for instance, despite having less demanding charging requirements, could still require centrally positioned charging stations or battery swapping stations if used for urban deliveries. IPFP3, on the other hand, states that depending on the battery size, this charging infrastructure becomes less important for e-bike riders who can charge at home overnight.

In Tanzania, for example, charging at home or at work is the common solution for most EV users. Despite only having one public charging station, the EV uptake in Tanzania is higher than any other country in the region. Nevertheless, IPNP4 states that one cannot assume people have electricity at home and even if they do, one cannot assume that they have excess energy to charge an EV of any kind, therefore the lack of charging infrastructure is seen as a barrier to increased EV uptake.

High Upfront Costs

Notably, high upfront costs was only seen as a barrier by one of the four for-profit private sector representatives despite being mentioned as a problem in three of the four countries. High upfront costs was referred to with regards to the cost for end-consumers. Issues of high upfront costs for the installation of necessary infrastructure e.g. charging infrastructure, was often referred to as 'lack of financing'. When asked about the topic of high upfront costs, IPFP1 responded: "*high upfront costs is not a factor for consumers, they also find a way to finance petrol motorcycles*". In most cases, mobility providers try to find a way to tackle the problem of high upfront costs and seek partnership with asset financers to make vehicles more affordable. An example from Kenyan e-bus provider, BasiGo, was given by interviewee IPNP4, who stated that the e-bus manufacturer and supplier developed an innovative business model and formed partnerships with banks to confront the issue of e-buses costing twice the price of a "*normal bus*".

Therefore, through asset financing opportunities, end-consumers or operators could have a way to finance EVs the same way they finance current mobility services. IPFP2 also commented on the issue stating "*It depends on who you are speaking with. So: high upfront costs in comparison to what?"* The interviewee went on to explain that when compared to the often imported "*15 year old*" used vehicles, EVs are more expensive, however, it is generally known that the total cost of ownership of used vehicles in East Africa is lower. When comparing acquiring a new EV with acquiring a new petrol powered vehicle, the upfront costs are also higher. However, thanks to initiatives by the government of Rwanda, that have waved all import and sales tax on EVs, providers are able to sell EVs cheaper than petrol vehicles.

Lack of Awareness and Nervousness around the topic

As depicted in figure 10, lack of awareness and nervousness on this new topic of e-mobility can directly influence a number of further barriers to e-mobility uptake. Awareness raising is one of the methods of tackling lack of education, thereby reducing the nervousness around the topic. When considering the end users of e-mobility, awareness raising efforts are reported to have a number of purposes highlighted in table 9:

Table 9 Goals of awareness raising activities to end-users

1) Introducing it

- Raising awareness of the existence of the option of e-mobility and the various products (IPNP1, IPFP2, IPNP 3, IPNP4, IPFP4)

2) Answering the questions of "why" e-mobility is important.

- According to interviewees IPNP1 and IPFP4, environmental consciousness is unlikely to be a motivating factor for most end users. IPFP4 continued to say issues of climate change only become relevant to end users if directly linked to problems they are facing e.g. 75% of Tanzanians live in rural areas and are less likely to be concerned about climate change but rather about getting enough rain. However, if farmers understand that the drought they experience is as a result of climate change and e-mobility plays a role in combating it, then this aspect becomes of concern. Besides this example, the lower total cost of owership of EVs is considered to be the most commonly used and effective motivating factor for "why" (IPFP1, IPFP2).

3) Ironing out misperceptions and controversial campaigns

- Misperceptions are also a common occurrence as e-mobility is a new technology. Although some miperceptions might stem from a bit of truth, interviewee IPFP2 stated the following misperceptions and nervousness resulting from the lack of awareness and education on e-mobility:
  - EVs are not strong enough for the African terrain
  - The hills are too steep
  - Batteries catch on fire
  - They are too expensive (as a principle thought, without investigating the actual affordability)
  - Range anxiety (as a principle thought, without necessarily finding out more information on the range batteries can cover)
  - They are slow
- Additionally, according to IPFP4, certain campaigns *"make fun of e-cars"* e.g. likening the quieter engine sound of a Tesla to a bee, in comparison to the powerful sound of a Mustang's engine seen as more 'manly'. Whether created out of humour or spite, controversial campaigns can create image problems, put off a part of the population and diminish uptake. Counter campaigns can provide alternative perspectives enhancing attractiveness.

Besides awareness raising efforts for end users, awareness raising and lobbying efforts also need to target:

- solar infrastructure investors, who according to IPFP1 were stated as being unwilling to finance unproven, high risk projects;

- end-user financers e.g. banks who according to IPFP2 and IPNP4 are used to financing petrol vehicles but have similar fears of EV as certain end-users e.g. battery explosions as well as fears on how to handle insurance, and finally
- governments, to increase their involvement (IPNP 1, IPNP 3, IPFP2) .

5.1.2. The Role of the Government in E-mobility uptake

The perceived extent to which the government should be involved in e-mobility planning and uptake varies within the different sector groups. However, one aspect is concurred upon across the board: the government should create an enabling environment for e-mobility adoption. The idea enabling environments has existed since the early 1990s. The Hunger Project (1994) defines it "*to consist of the attitudes, policies and practices which stimulate people to take action and enable them to succeed.*" ILO (2014) define enabling environments for businesses as ones which "*create the right framework that enables businesses to start, grow and create decent jobs*" i.e. through adopting a certain mindset and creating the necessary policies, e-mobility (companies) are given the chance to establish themselves in the market and grow.

Current contribution of government in e-mobility uptake

The current role of the government also differs in the different East African countries. All countries representatives concur to some efforts being placed by the public sector but believe that more could be done. The exact role of the government was not always perceived in the same manner by different stakeholders within a country. Figure 13 shows the complied responses from country representatives when asked what they perceive the role of the government in e-mobility uptake in their country to be. The contrasting views are depicted where applicable.

UGANDA

- They have appreciated the need
- Some policy framework
  - Some tax incentives
- President is a key promoter
- Some investments: Kiira Motors

- Causing frustration
- Slow, delaying processes
- Overall policy and competence is lacking
- Not enough financing
- Import procedure not clear
- Not enough awareness on available opportunities e.g. tax reduction
- Not enough emphasis on intersector links
- Corrupt
- Reactive and not proactive

KENYA

- President trying to champion EVs
  - Doing advocacy
  - Helping user education
- Some tax reform

- Policy is hostile
  - Policy makers need to be educated
- Taxes increasing (for everything in general)
- More incentives needed

TANZANIA

- Pushing charging infrastructure (to a certain extent)
- Some emission reductions policy framework
- Vice president engaged in advocacy
- Some policy development on EV registration
- Import tax reduction

- Little operalisation of climate change policy
- Very complicated non-cohesive processes
  - Registration
  - Solar charging infrastructure installation

RWANDA

- They have identified the need
- Pushing charging infrastructure
- Major tax reform for e-cars, hybrid cars and e-motorcycles (0% import and sales tax)
- President is a key promoter

- There is still room for improvement but the government is not considered to be specifically hindering EV uptake

Figure 13 Positive and negative perceived roles of governments in Uganda, Kenya, Tanzania and Rwanda

5.1.3. Current landscape of e-mobility planning in East Africa. Which sectors are playing a major role?

Private for-profit players

All sectors in all countries acknowledge the private sector as the ones leading e-mobility introduction and implementation into East Africa. The interviewed private sector for-profit players in Uganda, in fact, view their sector as the sole contributors to e-mobility uptake achievements in Uganda. To them, local NGO work is "*useless*" and the impact of multi-lateral agencies negligible. Private for-profit players are sometimes referred to as "*the innovators*" or "*startups*" in the interviews and their role is considered as being critical for the introduction of this new innovation. According to IPNP4 "*multi-lateral organisations and governments are normally risk averse. Startups on the other hand, can make small incremental mistakes and grow from that"* a quality of importance when introducing a new item onto the market.

Multi-lateral organisations

Acknowledged for their key roles in knowledge sharing, research, network establishment, policy advocacy and initiating pilot projects, multi-lateral organisations' work is generally more valued by the private non-profit sector (IPNP1-4). When asked about the extent of their importance, IPNP1 states "*they are key, especially since one of the biggest challenges is lack of information and inadequate data*". The private for-profit sector players' opinions range from completely disregarding the importance of their work in e-mobility uptake (IPFP1) to acknowledging their work in research and information sharing but criticising their distribution of funds as some countries benefit financially more than others (IPFP4).

Local NGOs

Their impacts are generally not acknowledged by the public for-profit players (IPFP1 and IPFP3), but among the non-profit sector their role in promotional activities, serving the needs of the local communities and enabling accessibility and affordability for the vulnerable is accredited (IPNP1).

Academia

Whether in the form of universities, research institutions or vocational educational training centres, these institutions are involved in research and development, implementing pilot projects and ensuring the longevity of capacity building, which according to IPNP4 is also being done by NGOs but they lack the longevity since their work if often based on a project timeframe. In Tanzania, the Dar es Salaam University of Technology is developing itself into an e-mobility hub and is pioneering the retrofitting of gasoline 3W vehicles to EVs (IPNP3).

The Government

As seen in the section above, the government's role in e-mobility uptake is acknowledged by at least one stakeholder in each country.

Others noted stakeholders include the media who contribute to "*awareness creation and helping to understand the importance* [of e-mobility]" (IPNP1) and the tourism sector which according to IPNP2 already encompasses a fair amount of cycling tourism with the potential of incorporating e-bikes.

5.2. Partnership and Collaborations

5.2.1. Openness to cross-sector collaboration

This section considers the openness of the public sector to collaborate with the private sector and the openness of the private sector to collaborate with the private sector. Overall, both public sector representatives indicated a clear openness to collaborate with the private sector. Table 10 highlights the openness of sectors to collaborate with the respective other.

Table 10 Openness of cross-sector collaboration between the public and private sectors in East Africa

Sector Represented	Country	Openness to collaborate
Public	Tanzania	Yes
Public	Uganda	Yes
Private non-profit	Uganda	Yes
Private non-profit	Tanzania	Yes
Private non-profit	Kenya	Yes
Private non-profit	Rwanda	Yes
Private for-profit	Rwanda	Yes
Private for-profit	Tanzania	Yes
Private for-profit	Uganda	No
Private for-profit	Uganda	No

In the private sector, views were scattered. Despite an indicated willingness to collaborate by most private sector players, it should be noted that the desired extent of collaboration was limited in for-profit private sector players. IPFP4 stated "*It is always best to partner with the government, partnering does not mean that they own shares and all that. It is rather just saying to collaborate [with the government]*." Most interviewees shared that consensus. The desired structure collaboration followed similar trends among the different players, in which the government could aid in certain processes such as issues in tax and a potential reduction or exemption, importation and registration or providing recommendations on whom to work with in the country. However, there would ideally be no direct involvement of government in the specific work where the negative impacts of collaboration, such as the slower pace of the government, will affect the work. IPFP2 said "*you want to involve government, but you also don't want to have to wait for them*". IPNP3 added that the government can be seen as a "*shock absorber*" for any challenges and ensure a favourable environment, however, all organisation and operations should be run by the private sector for efficiency. The section below looks into what exactly this desired collaboration could look like and which tasks would be fulfilled by which sector.

5.2.2. What could the public-private partnerships look like?

What the private sector can benefit from the government

Creation of an enabling environment without direct joint project implementation

In the majority of the cases, private sector players seek collaboration from the government without their direct involvement in the undertakings. In these partnership cases the role of the government could be as shown below:

Table 11 What the government can offer the private sector in collaboration

Public sector offers	Comments
Enabling policy development	
Financial incentives: • **Tax exemptions** • **Reduction in licencing** • **Reduction in electricity costs at charging stations**	
Disincentivising the use of petrol vehicles	
Enabling the faster movement of processes	
Clarification of confusing processes	Certain processes, e.g. vehicle and solar infrastructure registration in Tanzania is a cumbersome process that one has to figure out alone, working with the government could provide clarity on these processes.
Clarification of opportunities	Certain opportunities e.g. tax exemptions and reduction in Uganda are not clearly communicated. Collaborating with the government would place one at the source of the information.
Promotion and Visibility	By talking about or being seen with a product
Piloting EV projects	"Championing EVs". According to IP2, after the government in Tanzania started using compressed natural gas (CNG) cars, the population gained confidence and started to use them as well.
Vehicle uptake by government	1) If government mandates the use of EVs for all government vehicles 2) If they support their employees in getting EVs

Vehicle uptake through government programmes	Such as rural development projects supported by the government
Stakeholder involvement in policy development	
Joint research and development	For instance feasibility studies and collaboration with government university institutions
Enhancing inner government inter-sector linkage	E.g. if more traffic police are activated, the roads get safer which could enable EV uptake (IPNP1)
Institutional arrangements for provision of land for charging infrastructure	In Tanzania, involvement of the government for this is key as almost all strategically located land in owned by the government. The same PPP arrangement is applied on fuel stations. Without such agreements, the government can come and claim back the public land at any point in time, regardless of the sale/lease agreement (IPNP3).
Recommendations on whom to work within the country	
Joint development of EV standardisation	

In some other cases, for example for the provision of charging infrastructure, private sector players venture into joint project implementation with governments. In such cases the main roles of the government could be the provision of land and the provision of funds.

Provision of land

In the examined East African countries, the public sector is the biggest property owner, especially when considering optimal locations for public charging spots e.g. in public areas or at bus stops. IPNP3 and IPFP4 confirm that in Tanzania, another big motivator for partnering with the government for charging infrastructure land provision is to secure the long term availability of one's land. In Tanzania, all land belongs to the government regardless of whether one has purchased it or not. As a result, if the government decides that they have another desired use for the land that benefits the public, they are allowed to come and claim it back (IPNP3 and IPFP4). Such a situation could result in significant losses if one has invested in and installed charging infrastructure on the land. By partnering with the government, one guarantees long-term availability of the land. IPFP2 stated that in Rwanda one is guaranteed free land if one builds a fast charging station in an attempt to incentivise their construction. Findings from the interviewees revealed some projects which have already been implemented or are planned in East Africa under this structure, highlighted in table 12.

Table 12 Examples of collaborations where the government provided land for solar charging infrastructure

Project and Collaborating Partners	Project Details
Dar es Salaam Bus Rapid Transit system **DART and partner to be determined**	In the planned expansion, DART will allocate charging infrastructure space at the main bus depot as well as along the bus routes which are able to charge not only the planned e-buses but also to serve as public charging infrastructure on feeder routes for last mile operators (where mobility services are located to carry customers to further locations from the main transport route). It is yet to be decided which part of the funding, construction and operation of the services will be conducted by the public and which by the private sector.
Dodoma Charging Station **Government of Tanzania and UNDP**	The first public charging infrastructure in Tanzania. The government provided space and UNDP provided funding.
Zembo Charging Station **Government of Uganda and Zembo**	Provided as a negative example of partnering with the government, this project involved strenuous bureaucratic procedures by the private sector (Zembo) and four years between government acceptance for collaboration and actual granting of land for Zembo to construct charging infrastructure. IPFP1 highlighted this example as a reason to avoid partnership with the Ugandan government.

Provision of funds
Although the overall consensus of the interviewees was that the government, despite having the money, would rather invest it into other ‘more pressing’ topics than e-mobility, there are situations in which the government finances charging infrastructure. In Rwanda, grant funding by the government, such as the Rwanda Green Fund, specifically targets public-private partnerships in which the government would provide technical and financial support to projects that target transformational change (IPNP4).

IPNP4 adds that even if the government would not directly have funding for such projects, they could work with international or multi-lateral funding partners and be the ones responsible for the funds management and collaborating with the public sector on implementation.

Non-financial Incentives
In most cases, non-financial incentives, such as EV access to otherwise restricted zones or free parking, were considered to have little to no effect on overall increasing e-mobility uptake. IPFP1 refers to these as *"artificial benefits*", given that most of the EVs are 2&3W vehicles, they do not take up much space and are able to park anywhere. IPFP3 added that *"anyone can enter anywhere",* a previous attempt to ban motorcycles from a non-motorised transport lane in Kampala failed due to weak enforcement, therefore restricted zones have no impact. The only exceptions mentioned were that the introduction of bicycle lanes could encourage more e-bike mobility uptake (IPFP3) and the planned low-emission zones in Dar es Salaam which is aimed at encouraging the shift to E-2&3W, an initiative also planned in Kigali according to IPNP4.

Overall, non-financial incentives are acknowledged as functional in theory but are not perceived as important at this stage. Currently, financial incentives would have a bigger impact and the rest can be considered in the future.

What the government could benefit from the private sector
The expected role of the private sector is perceived in a unified way across the sectors and is highlighted in table 13. The initiatives below encompass the roles of the private for-profit and non-profit sectors encompassing both local NGOs and multi-lateral organisations.

Table 13 What the private sector can offer the public sector in collaboration

Private sector offers	Comments
Spearheading innovations	As governments are normally focussed on other topics that are considered more urgent e.g. energy provision, it is an unspoken expectation that the private sector initiates the process (IPNP3, IPNP4, IPFP4)
Provision of charging infrastructure	IPFP4 states that in general, it is expected that EV providers enable charging possibilities
Provision and/or operation of transport services	E.g. for the BRT system in Dar es Salaam
Taking risks, making mistakes and improving	According to IPNP4, specifically local NGOs and start-ups are enabled to take more risks than governments or multi-lateral institutions
Awareness raising, sharing knowledge, creating network-based partnerships	Particularly multi-lateral organisations have the capacity to engage local, regional and international stakeholders to learn from each other
Policy advocacy	Mainly through non-profit private sector players

Research and Development	Includes collaboration with research institutions
Creating a competitive environment	Indicated by IP2 as the benefit of having several private sector players involved, a competitive environment enhances the quality of services
Boosting the local economy	Through the creation of jobs, building local capacities and using local raw materials (IPNP3)

5.2.3. Barriers to collaborating

From the perspective of the private sector

As can be seen in table 11, there are several ways in which the private sector believes they can benefit from the public and in which they would like to collaborate with them. Nevertheless, most private sector players stated hesitance on directly collaborating with the government on projects. Regional differences also existed, specifically with regards to Uganda where private sector representatives clearly stated no desire to collaborate with the government in any capacity. Notably, issues of corruption were also more acknowledged in Uganda as compared to the other countries. Figure 14 shows the perceived types of challenges in the researched countries. The figure depicts the distribution of challenges in relative values due to the differing numbers for interviewees from the examined countries.

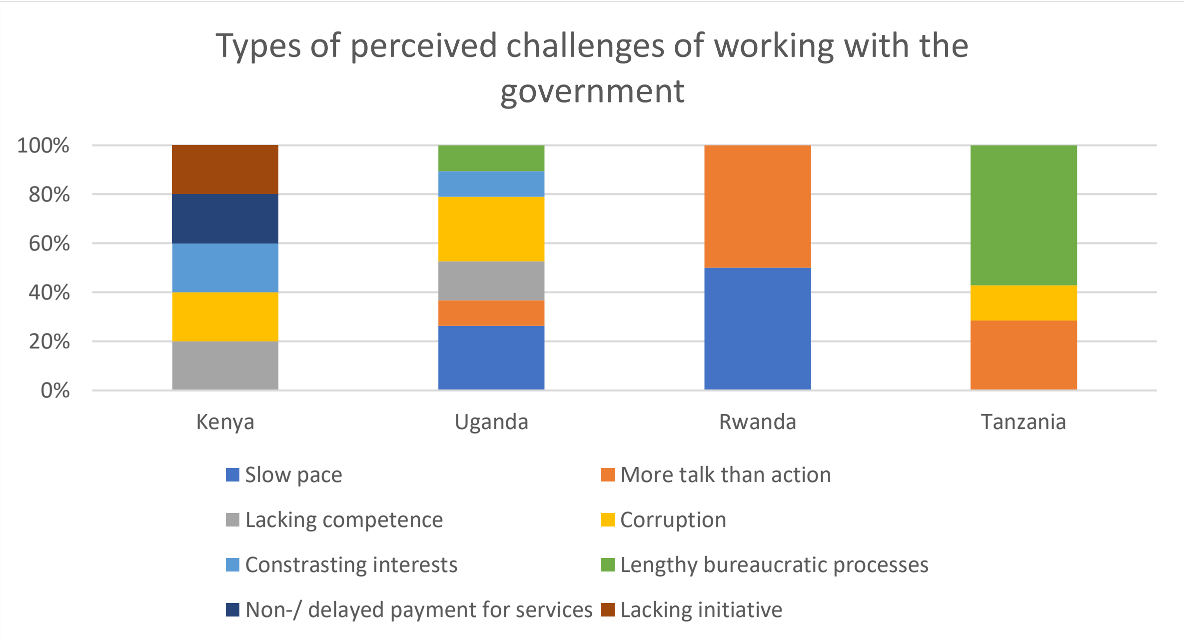


Figure 14 Distribution of perceived barriers to collaborating with the public sector as seen by the private sector

Overall, the least barriers for were present in Rwanda and Tanzania. Both countries' private sector players also viewed collaboration with the government in a positive light. For Tanzania, the issue of 'slow pace' mentioned in Rwanda and Uganda is considered as one of the motivating factors to partner with the government. Once working in collaboration, the governments can push processes faster than they would normally proceed.

The issue of 'more talk than action' is perceived in three of the examined countries. In the case of Rwanda, this refers to the government publicising the importance of e-mobility and creating financial incentives. However, there is close to no internal action to shift government vehicles, considered by IPFP2 as the biggest consumers of vehicles in Rwanda, to EVs. In Tanzania, governments have addressed the issue of climate change mitigation through their nationally determined contributions (NDCs), Dar es Salaam's climate action plan and various other announcements by ministry representatives including the vice president's office. Although a willingness for institutionalising is indicated, there is little operationalisation. 'Lack of competence' refers to the scope of policy creation and decisions regarding EVs, as well as lack of competence in operationalising existing PPP framework.

Corruption and financial conflict

Despite also being mentioned in Tanzania, corruption was only perceived as a real hinderance to collaborating with the government in Uganda and Kenya. In Rwanda, interviewees noted that corruption either does not exist, or it is hidden better than in neighbouring countries making it an irrelevant factor in e-mobility uptake (IPNP2). Kenyan and Tanzanian interviewees acknowledged the existence of corruption but explained that the opportunity of its impact is limited to very specific situations, for instance in larger solar construction projects or larger projects that involve tendering (IPNP4, IPNP3, IPFP4). However, in the majority of EV initiatives, such as the import of 2&3W which are tax exempt, there is no real room for corruption. IPFP4 stated that in most cases in Tanzania, the government does not do business, they will not normally invest into start-up projects. If there is no money flow there is no conflict.

The issue of money and conflict was a central theme in IPFP1's interview. According to the private sector representative, problems arise when money goes from the public to the private sector. Firstly, the public sector will be confronted by several other private sector players with favouritism accusations. As a result, in order to justify the provision of public finances governments place unrealistic reporting requirements on the private sector. The private sector will be forced to spend more time in bureaucratic procedures as opposed to implementing the project making the option unattractive to the private sector. According to IPFP1, with the current structures, *"the concept of PPPs is fundamentally broken".*

IPNP4 stated that corruption and the thereof resulting lack of payment for services to the private sector in partnerships is the major reason why most of the private sector players (close to 70%) would refrain from collaborating with the government. According to IPNP4, most innovators say that as a policy they do not work with the government.

Barriers to collaboration from the perspective of the public sector

Overall, the public sector did not perceive any barriers to partnering with the private sector that are directly related to the private sector. In the context of Uganda, IP1 stated that potential barriers could be the unclear partnership framework and the lengthy procedures of setting up the necessary paperwork for collaboration.

5.2.4. How public-private collaboration can be enhanced

Following the perceived barriers to collaboration, interviewees were asked what strategies they believed would enhance collaboration. As there were several overlaps among the private non-profit and for-profit players, the suggested mechanisms to enhance collaboration will be grouped.

- Increasing transparency on what and who is involved. This avoids hurdles at a later stage and decreases corruption. The public should be held accountable for investments and the private sector should push them to be open.
- Increasing interaction by making the government participate in civil society spaces and the private sector participate in government spaces.
- Creation of supporting policies and stakeholder involvement in policy creation
- Joint monitoring of activities and joint research and development
- Creating spaces for awareness raising and knowledge sharing workshops
- Joint creation of standards
- Creating easier processes that reduce the required bureaucracy, time and number of follow ups necessary
- Increasing the involvement of the public sector who have been "*currently taking a back seat*" (IP1)
- Enhancing the local content of projects to boost the local economy i.e. the involvement of local raw materials, industry and workforce
- Enhancing trust through openness (links to point 1)
- Government adopting the use of EVs in their operations
- Addressing the fears of the innovators/start-ups e.g. by ensuring payment for services
- A fundamental change in how public money is handled allowing access to funding by the public sector
-

5.2.5. The effectiveness of PPPs for e-mobility uptake in East Africa

In the final section of the interview, sector representatives were asked which collaborations they believed were the most important in e-mobility uptake in East Africa (i.e. is it partnerships with the public, or other sector partnerships). To highlight any sectoral and regional differences, responses were noted for each participant separately, indicated in figure 15.

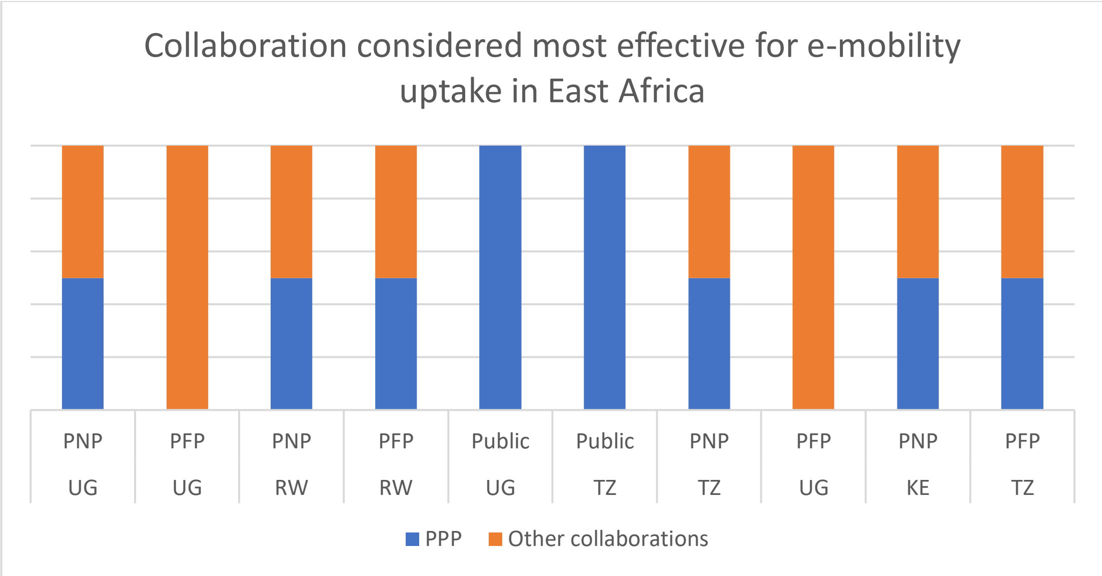


Figure 15 Collaborations depicted as most effective for e-mobility uptake in East Africa indicating regional and sectoral differences. PNP refers to Private non-profit entities and PFP refers to Private for-profit entities

Figure 15 shows that for most sector representatives both collaboration with the government as well as with other sectors is viewed as important. One exception is the public sector representatives, this is because although collaboration with other international government agencies generally exists, most e-mobility introduction is being done by the private sector making PPPs the relevant strategy. The second exception is the private for-profit sector in Uganda, who only seek other collaborations due to the perceived slow pace and extent of corruption within the public sector (see section 5.2.3.).

The other collaborations considered as important are highlighted in Figure 16. They aid in increasing education or enabling financing of the vehicles. Private sector players also require collaborations that ensure a steady supply chain of EVs and parts.

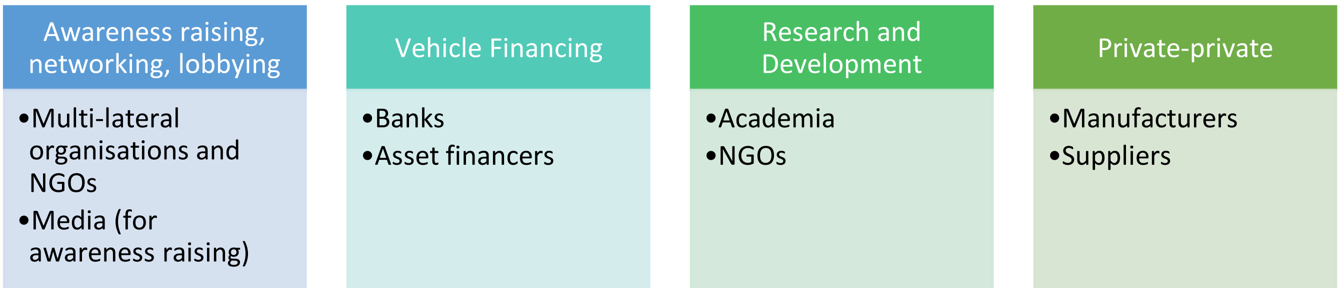


Figure 16 Examples of other collaborations needed for e-mobility implementation

All sector representatives acknowledged the importance of collaboration for the adoption of e-mobility. However, not all representatives view collaborations as the most important factor. IPFP2, for example, states that while nothing speaks against PPPs, the biggest impact for enabling e-mobility uptake would be to get vehicles on the ground. People need to see and test EVs to be convinced by their benefits. Partnerships enabling this, not only through awareness raising activities but mainly through funding such activities, would solve the current challenges and accelerate uptake.

5.2.6. Discussion to use of research theory

The research theory development used a deductive approach, the supplementation with qualitative exploratory data collection allowed for the formation of new theories grounded on the information retrieved. Using an inductive approach to the research topic could have opened the door for more attention to be paid on other aspects hindering e-mobility uptake, which if addressed could cause the large scale adoption. For example, the biggest perceived accelerator by one interviewee was enabling the access to e-cars for people to be convinced through firsthand experience (more information below in the discussion section 6.2.). Addressing all barriers in an open way using an inductive approach could have led to the development of even more effective strategies to tackle these challenges as opposed to pre-confining it to collaborations and PPPs. Nevertheless, the current methods for the overall theory development and data collection provided valuable insights about government collaboration, other important collaborations as well as some important other aspects for e-mobility uptake. Therefore, to keep the research within a manageable scope, the deductive approach would remain the selected method. However, one additional question would be added to the interview guide to go beyond the pre-confinement, namely, the question: "What in your opinion would be the most effective approach to increase e-mobility uptake in your country". Although e-mobility implementation is an interlinked process requiring several aspects to be successful, the addition of this question would encourage participants to reflect on any overlooked important factors to be considered.

6. Discussion

The study aimed at examining the effectiveness of PPPs for e-mobility uptake in East Africa. For this, data was collected through qualitative interviews with 10 representatives from the public (2), private non-profit (4) and private for-profit sectors (4). All sectors recognised the necessity of collaborations in enhancing e-mobility uptake in East Africa. Eight of the ten stakeholders also acknowledged the importance of collaborating with the government in e-mobility uptake, although various factors contributed to the desired extent of collaboration.

The perceived barriers to e-mobility adoption by the interviewees largely coincided with the findings from the desk-based research. A variation was noticeable on the perception of high upfront costs as a barrier. While electric vehicle procurement costs are higher than gasoline vehicles, financing collaborations, such as with e-motorcycle provider Ampersand and asset financer Bbox or between e-bus provider BasiGo and banking institutions, tackle the issue of high upfront costs. In Rwanda, smart regulation in the form of removing all import and sales tax on e-cars and e-motorcycles has allowed them to be sold cheaper than new gasoline vehicles. Nevertheless, used cars are still cheaper and until recently, there was a lack of regulation on used cars resulting in part of the population not willing to do the shift (IPFP2). Recent studies (Siemens Stiftung, 2020; Conzade et al., 2022), however, have shown that the total cost of ownership (TCO) of EVs is significantly lower than the corresponding ICE vehicles. IPFP2 stated that this realisation, including the extra costs necessary to repair old used cars, is becoming evident in Rwanda. Nevertheless, there is a need to an increase in awareness in the population.

Together with inadequate solar charging infrastructure, a lack of awareness and education on the topic was perceived as a challenge of e-mobility uptake in East Africa by the interviewees in every country, despite not often highlighted among the biggest barriers of e-mobility uptake in literature. Unlike some of the other barriers, the resulting nervousness on the topic stemming from a lack of education, has a causal relationship with other challenges. Its impacts expand beyond directly affecting the end-users' awareness and willingness to shift to e-mobility, to affecting the availability of funds for acquiring EVs due to hesitant asset financers and banks as well as lacking solar infrastructure due to hesitant investors.

Lack of energy access was not stated as a major barrier to e-mobility uptake. This might be because interviewees grouped this problem under the topic of charging and simply referred to the lack of charging infrastructure as an issue. In Tanzania, this might not be a point of concern as the government is currently working on a big energy project which according to IPFP4 is in part considered by the government as a strategy to meet the future demands from EV uptake. Currently in Tanzania, most people charge their EVs at home as electricity is still considered cheaper than buying petrol, this implies that the lack of access to energy is not a problem for several EV users. This could explain why Tanzania currently has the highest annual EV uptake besides the almost non-existent public charging infrastructure. In Kenya, on the other, IPNP4 states that one cannot assume that everyone has access to electricity at home. As mentioned above, it is possible that the two challenges of lack of access to energy and lack of adequate solar infrastructure were considered the same in this aspect.

6.1. Collaborations for e-mobility uptake

All interviewed sector representatives acknowledged private sector start-ups and companies to be pioneering the adoption of e-mobility in East Africa. However, several other sectors are playing important roles including the non-profit sector, academia and media. In most countries, the government was also considered to be an active stakeholder though not having the most prominent role in e-mobility implementation. Overall, the interviews revealed that collaborations are seen as vital for enabling e-mobility uptake. Different sectors are acknowledged for their different roles and the analysis shows a broader governance strategy and a division of labour as highlighted in ecological modernisation (Hanf, 2003; Geels et al., 2019).

Sectors are unified by the goal of increasing e-mobility uptake. The specific reasons behind that goal, however, differ between the sectors. IPFP1, a private for-profit sector player, states that "*it all comes down to money*" and IPFP2 explains that in Rwanda, mostly private sector companies are involved in enforcing e-mobility uptake because of the financial gains. Private non-profit players, IPNP1 and IPNP4, on the other hand, mention serving the needs of the people in the community and addressing climate change as a reason to shift to e-mobility. Regardless of these differences, sector players are able to take joint action to enhance e-mobility adoption, as they all see a benefit from it, creating win-win situations, which according to PPP framework, is one of the main reasons entities choose to collaborate (Nie et al., 2021).

As mentioned above, almost all interviewees see the importance of collaborating with the government, and in line with ecological modernisation, almost all of them described the role of the government as being key in creating an enabling environment for e-mobility uptake. IPNP1 stated *"[when it comes to enabling e-mobility uptake] government becomes a key actor. They should provide a proper environment through policy regulation, tax and other incentives, in promoting it and they should pilot in partnership".* This enabling environment, as described, would give start-ups the opportunities to test different solutions and businesses an opportunity to experience economic growth. At the same time, the society experiences benefits, such as an overall reduction in transport costs, which normally contribute significantly to household costs, all through the adoption of low-carbon mobility alternatives that contribute to pollution prevention (Njoroge and White, 2023).

The idea of the joint development of interventions mentioned by Hanf (2003) and Ali (2013) was confirmed through interviews by the suggestion to increase sector working groups to allow for participation in regulating the e-mobility sector (IPNP1). Private sector for-profit players also indicated the necessity on being included, for instance on the development of standards (IPFP1). IPNP3 highlights the importance of standards to stop the current continual import of low quality products which are too quickly becoming e-waste. Setting these standards should ideally include the expertise of the private for-profit as well as the non-profit sector to ensure that the benefits for the economy, environment and society are taken into consideration.

While collaborations in general are deemed necessary, differences can be seen in *which* collaborations are considered the most important. Some interviewees viewed government collaboration as the most important, others collaborations with financing institutions, others with awareness raising and lobby initiators and others with manufacturers. The perception of importance largely corresponded to what would best help the sectors achieve their reasons behind the goal of enhancing e-mobility uptake. For private for-profit sector players, the most valuable collaborations involved sales of the product, namely: acquiring the product (private for-profit and private for-profit collaborations with EV suppliers and manufacturers), selling the product (private for-profit and private for-profit collaborations with financers) and how to get more people aware to buy the product (potentially private for-profit and private non-profit collaborations for awareness raising).

The different private sector players also presented differences in the extent to which they would be open to collaboration with the public sector. Private non-profit players were generally more open to different forms of partnership with the government. Private for-profit interviewees on the other hand were less open to the idea of direct project initiation. The public sector generally mentioned being open to all forms of collaboration. Previous PPP experience from the Dar es Salaam Bus Rapid Transport Project mentioned in 3.3.2 left city officials open to the idea of further collaboration in the expansion plans which involves new routes equipped with e-buses. The specific roles of each sector in the PPP are still to be determined, however, the perceived positive outcome of the previous PPP has led to the city administration seeing PPPs as an effective strategy for e-bus project implementation.

For the private sector interviewees, the main barriers to engaging in PPPs partly coincided with findings in the literature review, namely: a lack of institutional competence and capacity and the political environment. Inadequate framework also formed a challenge, as despite the existence of PPP framework in all of the research countries, two interviewees considered framework to be unclear with specificities of how to partner and what the roles of partners would be. Nevertheless, this was not considered a main barrier. Research findings did not reveal barriers directly relating to an unstable macroeconomic situation or societal barriers. The absence of societal barriers can be attributed to the aspect that qualitative interviews were performed with sector representatives and not members of the public. Although reluctance to invest in e-mobility because of the risks exists, the reported reason of risk related more to the newness of the innovation and fear of investing in an unproven model as opposed to instability in the macroeconomic environment.

Most of the barriers related to institutional incompetence, including a slow operational pace, length of bureaucratic processes and corruption. For the private for-profit sector representatives from Uganda, institutional incompetence led to their complete averseness to collaborating with the government.

6.2. PPP structures considered to be effective

When considering PPPs, different structures exist depending on their intention. The best practices highlighted in section 3.4. and summarised in 3.5. give examples of different PPP set ups successfully integrated in Europe, namely: PPPs for charging infrastructure provision, PPPs for research, skills and knowledge sharing and PPPs for facilitating uptake, through policy and regulation adjustment. In the case of East Africa, while PPP exertion for charging infrastructure provision exists, most findings correspond to a desire to collaborate in the capacities of the last two PPP structures explained.

PPPs for research, skills and knowledge sharing

As mentioned, a lack of awareness and education and the thereof resulting nervousness on the topic are some of the biggest barriers to e-mobility uptake. Collaborating with multilateral organisations and NGOs can enable access to national and international knowledge sharing platforms. Such platforms can provide the public sector with information on the benefits of e-mobility, challenges previously faced and strategies to overcome them as well as provide insight which assists in adequate policy establishment. Additionally, private non-profit sector players report often engaging in capacity building activities including in developing technical skills as well as implementing pilot projects. Whether in direct collaboration with the government, with public universities or even when performed entirely by the private sector, pilot projects allow for research and data collection on the topic which is vital to providing the necessary proof that reduces nervousness on the topic for the government, general public and financing institutions. Pilot projects also enhance the visibility of e-mobility options and reveal challenges such as unclear registration processes for EVs. According the IPNP3 "*[pilot projects] are the way to go, the SolutionsPlus [funded] demonstration projects in Dar es Salaam not only provided insight to the government, but also got other private sector players interested and started further initiatives*".

PPPs for facilitating uptake by policy and regulation adjustment

Most of the feedback from the interviews pointed to this collaboration structure being the most desirable. This structure refers to the creation of an enabling environment for market growth which ties into the idea of ecological modernisation. Adjusting the regulatory environment such as through tax exemptions as seen in Rwanda or the special electricity tariffs on EV charging in Kenya and Rwanda boosts the uptake of EVs and enhances the market while also allowing the rewards to be reaped by the public. One of the challenges depicted in Figure 14 and discussed in section 5.2.3 is 'more talk than action'. Concurring to findings in section 2.2, although some African countries have taken steps in developing framework and policy on enhancing e-mobility as a climate change mitigation and air pollution reduction strategy, there is a need for that framework to be operationalised. Incentives created through smart regulation steers operationalisation even if not undertaken directly by the government. In East Africa, this could be specifically beneficial as interviewees stated that the government is either focussing their time and funds on other projects deemed more important to sustaining basic livelihoods or seen as more valuable to push political agendas. Additionally, some government transport planning departments are understaffed and lack the human capacity to foster the adoption. IP1 stated "*[the government would have interest in venturing into e-mobility] but it's hard to focus when you're scanty, so you only tackle the basics*".

The role of incentives

Qualitative interview findings revealed that currently, the only incentives to have any significant impact on increasing e-mobility uptake are financial incentives. Non-fiscal incentives only become relevant if adequately enforced, as seen by the example mentioned by IPFP3 in 5.2.3. in which a lack of enforcement made the ban of motorcycles on a non-motorised transport lane void. A non-financial incentive such as rent free government land for charging stations mentioned in table 3, could be considered as more attractive for some sector players. The example of the collaboration between the Government of Uganda and UNDP in Dodoma, Tanzania shows this incentive in practice. However, it is unclear whether UNDP would have still installed this charging station without this incentive. In Uganda, rent free government land was once again shunned by private sector companies, one of whom stated "*if can choose signing a deal with a landlord within 15 minutes and having my place or having to deal with the government until I get a signed place […] I do not want to deal with the government, they are just slowing everything down*" (IPFP1). Most interviewees recognised the potential benefit of non-financial incentives, but considered them as something premature for the current stage of e-mobility uptake in the countries.

6.3. Reflections on data collection and discussion

A general consensus of the importance of collaboration exists between the public and private sectors for e-mobility uptake. An exemption to this trend were public sector companies in Uganda, who viewed collaborations with the government as something to be avoided. This could largely be due to deficits in the institutional capacity and competence perceived as a bigger problem in Uganda than other East African countries.

Another reason could be the differing interpretations of the definition of PPPs. The World Bank (2022b) definition in section 3.3 describes public private partnerships as "a long-term contract between a private party and a government entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility, and remuneration is linked to performance". Discussions about PPPs with Ugandan representatives (both with the public and private sector) were more linked to this definition, some interviews were dominated by the topic of project funding, flows of money and the hurdles that exist with the government remunerating the private sector. Discussions with sector representatives from other countries, on the other hand, had a looser definition of partnership and focussed on the potential of the government creating an environment that enhances uptake through the provision of incentives, helping to smooth processes such as registration, enabling the faster movement of processes in general as well as promotion and visibility. IPNP3, IPNP4 and IPFP4 proceeded to say that as long as there was no money flow, collaboration with the government could proceed smoothly. The only exception mentioned was with regards to infrastructure projects, due to their scope and long-term nature, collaboration understandings have a closer resemblance to the World Bank (2022b) definition where official agreements are established to ensure long-term rights to operate and to secure that land will not be taken away, even with a change in government.

For most private sector companies, collaboration with the government is looked for from the moment of market penetration. For certain scopes of collaboration e.g. vehicle uptake by government and through government programmes, the added value for both parties is clearly visible. However, during the interviews, a similar statement arose especially from the Tanzanian but also from the Kenyan interviewees: "you have to collaborate with government", unlike a statement made a Rwanda interviewee mentioned in section 5.2.1 "*you want to involve government, but […]"* (IPFP2). The former statement, together with certain reasons for collaboration stated in table 11 e.g. "enabling the faster movement of processes, clarification of confusing processes and clarification of opportunities" poses the question of to what extent private sector companies *want* to collaborate with the government vs to what extent they *need* to collaborate with the government simply to avoid the disadvantages that come from not collaborating with them? When asked one of the final interview questions on whether they think collaboration with the government would make larger scale e-mobility uptake in their country/East Africa more efficient, respondents from Tanzania, Kenya and the private non-profit sector in Uganda responded yes and yes, definitely. According to IPNP1, unlike private companies, NGOs in Uganda have had positive experiences collaborating with the government on e-mobility tax exemption efforts and awareness raising activities. From Rwanda, IPFP2 commented "*nothing speaks against PPPs, but it is not necessarily the collaboration that would solve the current 'challenges' and accelerate uptake."*. For them, the biggest perceived accelerator would be for the public to get access to an electric car, experience the benefits and spread the news.

Looking at the country distribution of interviewee perceived challenges to e-mobility uptake shown in figure 12, Rwanda was the only East African country to not mention the lack of policy as a challenge, the literature review also showed Rwanda as the country in East Africa with the greatest number e-mobility policies and incentives, the most significant of which is 0% VAT and import tax, as concurred by IPFP2. This poses a further question (for further research) on the relationship between the existence of adequate e-mobility policy and the demand for e-mobility related public and private collaboration within a country. Feedback from the other countries with less policy report governments slowing down processes, being unreliable and in some cases directly hindering EV market growth through unfavourable policies (IPFP3).

7. Conclusion

E-mobility has arisen as a solution to combat climate change and air pollution especially in cities around the world. While the African continent currently contributes the least to global GHG emissions, trends in population growth, urbanisation and a high number of used vehicles imports is already showing impacts on road transport CO_2 emissions which increased by 70% between 2009 and 2018 (Njoroge and White, 2023). The young, tech savvy African population provides a promising capable workforce, and coupled with the abundance of raw materials for EV and battery construction as well as the richness of renewable energy sources makes this market suitable for fostering large scale e-mobility adoption. Unfortunately, certain factors make the uptake of e-mobility a challenge. Some challenges are generic for the uptake of e-mobility anywhere, such as the necessity of a reliable charging infrastructure. This, together with challenges such as a lack of awareness, a lack of policy and a lack of financing forms hurdles in e-mobility implementation and upscaling in East Africa.

Partnerships between the public and private sectors offer opportunities of addressing such issues and fostering e-mobility uptake in a way that benefits both the public and private sectors. In East Africa, governments often lack the technical capacity and human resources to work on e-mobility uptake, and although funds may exist, developing country priorities steer funding towards meeting basic human development needs such as providing access to electricity. Projects which, according to interview findings, have the additional advantage of helping political campaigns as they are ventures that everyone understands and appreciates. The private sector on the other hand is seeing a boom in e-mobility start-ups and is said to be leading the mobility transformation. There is also a rise in multi-lateral associations leading network-based partnerships. The associations work on e-mobility knowledge sharing, awareness raising and project piloting with cross-sector stakeholders. These different interventions demonstrate the governance approach of e-mobility uptake in East Africa.

Nevertheless, all governments in the East African countries have shown, at minimum, an appreciation for e-mobility validated by a few basic interventions. Some of them, for example Rwanda, have taken significant steps in enabling e-mobility uptake through smart policy establishment and strong incentives. These mechanisms prove to be effective as interview findings reveal Rwanda as the only country where private sector stakeholders do not consider the government to be hindering EV uptake in any way.

In countries such as Kenya and Tanzania, partnering with the government is an effective measure to enhance e-mobility uptake. Through collaboration, private sector players hope to benefit from faster processes and available opportunities they were previously unaware of. Partnering with the government is seen as a key tool in simplifying e-mobility uptake. A different situation can be seen in Uganda, where private companies shy away from the idea of partnering with the government. According to IPFP3 "*if the government is not involved, things move better. When they get involved things get crazy*". Findings also show that the Ugandan government has the weakest e-mobility policy, competence and awareness.

Awareness should be raised of the difference in understanding of the term PPP. Most desired partnerships, especially from private companies, indicated working together in a way that the government facilitates an environment to work effectively in as opposed to direct joint project implementation. It was pointed out by IPNP4 that "*especially for the introduction of* *new things",* engaging the government is invaluable for easing processes before clear structure exists. For established sectors this might not be as necessary.

Therefore, to address the research question on whether public-private partnerships can be effective for e-mobility planning in Africa, the local context is evident and country- and sector specific differences must be highlighted. For private companies in Kenya and Tanzania, collaboration is a necessity to avoid inconveniences, in Uganda collaboration is perceived as a hinderance for companies and in Rwanda, private companies welcome partnerships but do not see it as a decisive factor. The private non-profit sector state the importance of knowledge sharing collaboration with the government throughout the process of introduction and adoption to not only ensure economic and social benefits, but also to ensure the inclusion of environmental concerns such as how to deal with e-waste. They also see the importance of including the public through test rides and awareness raising events.

In addition to the government, businesses and NGOs, further partnerships were also seen as vital to e-mobility uptake. The main partnerships highlighted were with asset financers, banks, and e-mobility investors; EV suppliers and manufacturers; the academia and players that enable awareness raising such as the media. Specifically awareness raising was viewed as highly important as a lack thereof can create nervousness. Challenges in finding willing investors, for instance, mostly stem from nervousness around the new 'unproven' technology as opposed to any kind of perceived macro-economic hinderance.

Findings of this research verify the conceptual framework highlighting that the introduction of e-mobility goes beyond the technical change and requires a system change. There is a necessity for governance as one sector player would not be able to manage introducing e-mobility and facilitating its adoption alone. In most cases, specified government collaboration is important, but other partnerships are also viewed as vital. Country-specific differences inhibit the possibility of making an extensive conclusion but rather give an understanding of the situation in East Africa. Further studies could look more specifically into the extent of agreement formality between the public and private sectors in the countries to examine whether they truly fall into the PPP category. Other studies could also investigate at what point collaboration turns from a necessity to an option, if companies would still seek collaboration with the government once it becomes an option and not a 'necessity to avoid inconveniences' and what these new structures of partnership would look like.

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Appendices

Annex 1 Interview guide for semi-structure interview

Interview guide

Examining the Effectiveness of Public-Private Partnerships in E-Mobility Planning for Sustainable Transportation in East Africa

<u>Procedure to begin the interview</u>

- Thank interviewee for participating in the research
- Provide background information on my studies and to the thesis topic
- Give estimated time frame
- Explain the interview procedure (Intro question followed by 4 sections)
- Clarification that the terms 'government' and 'public sector' will be used interchangeably
- Clarification that unless otherwise specified, 'private sector' can refer to for-profit companies as well as non-profit organisations/NGOs/multi-lateral organisations/international development agencies
- Inform about interview recording and anonymity
- Answer any further questions they might have

Personal notes: Research Questions Listed

Can PPPs be an effective approach for e-mobility planning in East Africa?

1) *What are the opportunities for PPPs in e-mobility uptake?*
2) *What is the current landscape of e-mobility planning in East Africa, and to what extent have PPPs been employed in this context?*
3) *What are the main obstacles and challenges faced by PPPs in East Africa?*
4) *What is the influence of various stakeholders, such as government agencies, private companies, and civil society, on the potential design, implementation, and outcomes of e-mobility PPPs in East Africa?*

Orange questions only for the private sector

Introductory question:
To begin, would you please briefly describe your professional/academic background. Where do/did you work, what is/was your role in the organization? How long have you been working in the sector?

Topic 1: E-Mobility Specific Questions

General Questions on current status of e-mobility uptake and planning

1. In your opinion, what the biggest challenges in e-mobility planning and uptake in East Africa

    a. If high upfront costs are mentioned: is it meant for a consumer? Or as an expert considering establish the infrastructure?
    b. It talked about charging infrastructure, does this apply to e-bikes as well?

2. What would you say is the current role of government in enabling e-mobility uptake?

    a. Only Private: Would you say they are helping to enable it or perhaps even hindering it in a way?

3. Which *other* stakeholders/sector representatives would you say are most involved in introducing or planning the uptake of e-mobility?

Topic 2 PPPs:

Collaborations and Partnerships as potential solutions

Brief explanation:

As mentioned before, in this study I am investigating whether public private partnership can be an effective approach at e-mobility uptake in East Africa. Where the private sector players can for example bring the necessary investments and/or required construction, technological and operational skills and expertise for quality services, while governments can make sure there is for example space provided including engaging local communities on this if necessary, they can work on supporting legislation, funding, and overall oversee projects and make sure the public is serviced and the investors receive their renumeration.

4. How do you see the idea of PPP in (country)?

    a. Do you see an increasing trend?

    b. Are you aware of any such partnerships between the government/public sector and the private sector (companies/NGOs etc.) current or past ones, in the e-mobility sector?

Looking at some examples of PPPs in e-mobility in other parts of the world, there are a number of main sections where I have seen them involved:

5. Firstly: Charging infrastructure provision e.g. city: funding + space (maybe operations), energy provider: funding, maintenance (maybe operations + management)

a. Can charging infrastructure be set up through collaborations in Uganda/Kenya/TZ/Rwanda?

i. If yes, what part do you think the government could take over and what would the private sector be responsible for?

ii. If no, why not?

6. <u>Secondly:</u> Financial and non-financial Incentivising and subsidising e.g tax reduction, entering restricted zones, free parking: collaboration between government and e-mobility provider/transport companies

    a. Do you think incentives / subsidies would make a significant impact in e-mobility uptake?

    b. Why and which factors specifically? *(tax reductions, restricted zone access etc)*

    c. Do you have any knowledge / examples of where this/smart regulation might already be working in East Africa?

7. If we look at the current partnerships present in e-mobility uptake in East Africa a lot of them are about networks, sharing knowledge and experiences, pushing policy development (led by the UNEP/Africa E-mobility Alliance)
    a. To what extent do you think these partnerships are actually making a difference in aiding e-mobility uptake?

8. A lot of e-mobility introduction is being done by private sector players (both for-profit as well as non-profit players including multi-lateral organizations):
    a. To what extent would partnering with the government help to move their initiatives to larger scale e-mobility work?

Topic 3: Interviewee Specific Questions

9. As a private sector player active in e-mobility introduction/planning, to what extent do you collaborate with the government?
   <u>OR</u>
   As a public sector player, to what extent do you look for partners in the private sector?

    a. If not already answered: Would you want to increase that partnership?

10. What barriers/discourages you from working in partnership with the government/private sector?

    a. For private sector: In not already answered: do issues such as corruption discourage you from seeking partnership with the government

    b. For private sector: To what extent does not partnering with the government allow you to avoid corruption?

Only for private sector interviewees:

11. What other sector players (other private for profit, NGO/non-profit, or international multilateral organization players) would be most attractive for partnership for you with regards to upscaling e-mobility? Why?

Topic 4: Future or E-mobility Planning and Uptake

12. Do you think partnership/collaboration would make larger scale e-mobility uptake in your country/East Africa more efficient?

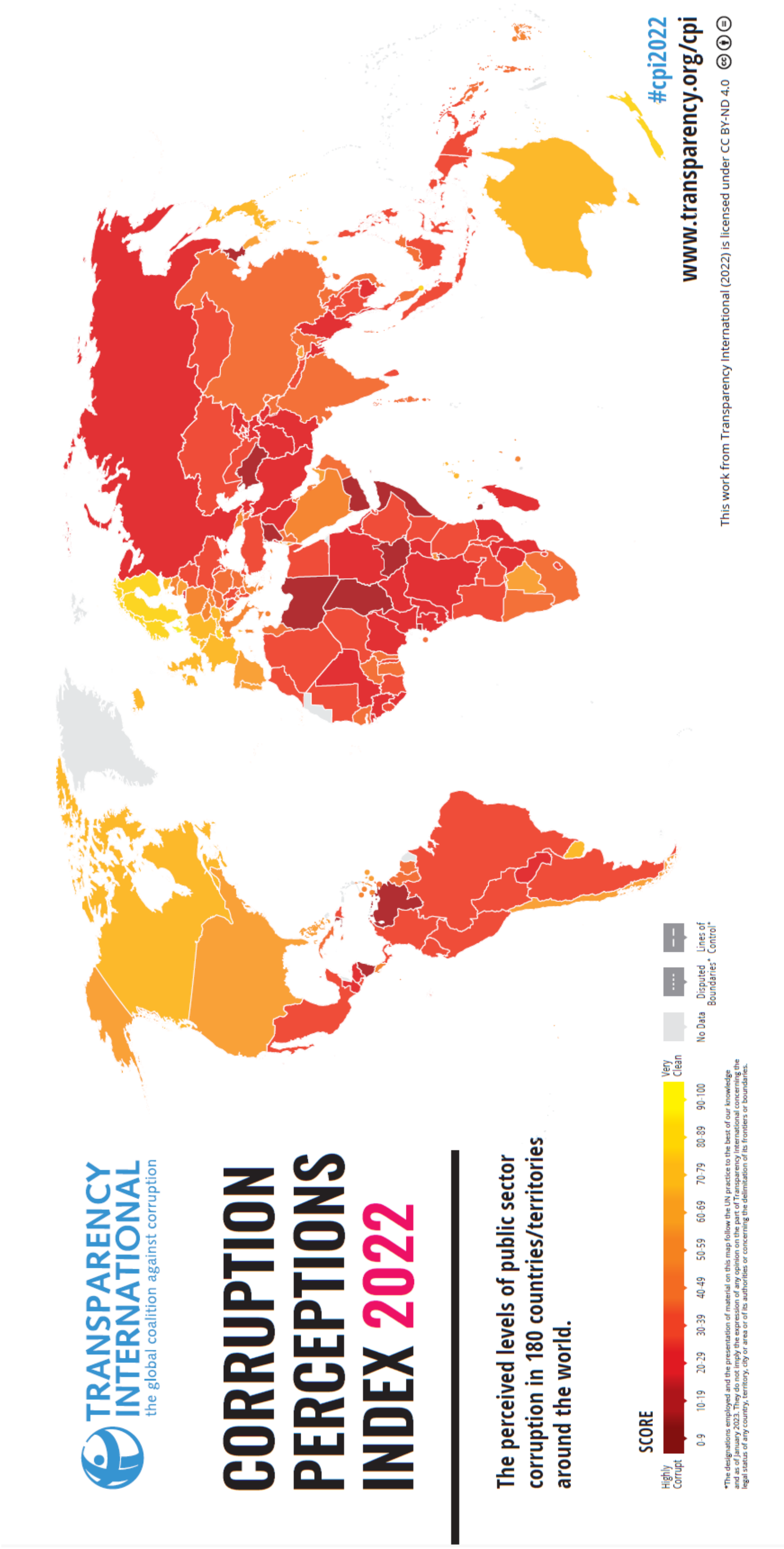
13. If so, for which specific purpose, between which sectors, what role would each sector have?

14. What kind of strategies are there to enhance collaboration?

Finishing question

15. To wrap it up – do you feel like we have left out anything important related to this topic, or do you have anything else you would like to add?

Annex 2 Corruption Index 2022 (Transparency International, 2023)



Annex 3 PPP Framework

Legislative Framework
This type of framework is the highest level 'umbrella' framework under which PPPs will function and the establishment of this can take several years. Legislative framework is enacted by the government and having this framework validates the government's commitment to the use of PPPs. Some countries have introduced specific laws relating to PPPs (Alfen et al., 2009). Especially when dealing with PPP which are long-term in nature thereby having to deal with changing environments, having this framework provides a favourable environment and a solid foundation which encourages private companies to participate in PPPs (Tshombe and Molokwane, 2016).

Regulatory Framework
This framework can be considered as a manual or guideline with which PPPs can be implemented. Currently, countries that do not have PPP legislation at least have official set of guidelines on PPPs. The government of South Africa has several documents in this regard, for example the National Treasury's Public Private Partnerships Manual, while the government of Botswana has established PPP Policy and Implementation Framework (Tshombe and Molokwane, 2016). Since the different sectors in which PPPs are implemented are often regulated themselves, it is important that the PPPs are also supported with clear regulation. The regulatory framework ensures standards and accountability as well as maintains a level playing field for all the stakeholders involved. It protects the public's interests for instance from extremely high prices or other negative impacts that can come from monopolies while at the same time ensuring that the involved private sector players are not undermined by political intrusion (Alfen et al., 2009).

Administrative Framework
While both frameworks above are highly valuable, without adequate administrative framework their role becomes almost void. This framework aims to achieve consistency and efficiency in PPP implementation including in choosing the right PPPs to be involved in. The administrative framework helps the government in its role of project supervision including inspection and monitoring (Alfen et al., 2009).

Contractual Framework
This framework is project specific and contains the project agreement. It facilitates the interaction and collaboration between the different stakeholders and since each country, project and group of stakeholders involved have their own specificities, the framework needs to be adapted and tailored to the situation at hand. Among other things, it maps out the project's goals and how success can be measured, how labour will be divided, who shall bare which risks according to the partners' ability to manage the risks and what incentives exist for each stakeholder. Overall, by agreeing upon framework indicates the commitment by each involved party (Kamel et al., 1998; Alfen et al., 2009).