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Ghana Mobility Study - SPTA

FINAL REPORT

Market Potential, Clients and User Groups for New Mobility Services In Ghana

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Acronyms

ADUG	Automobile Dealers Union of Ghana
AMA	Accra Metropolitan Assembly
CKD	Completely Knocked Down
DoT	Department of Transport
DVLA	Driver and vehicles Licensing Authority
EV	Electric Vehicle
GAMA	Greater Accra Metropolitan Area
GAMDP	Ghana Automotive Manufacturing Development Program
GAPTE	Greater Accra Passenger Transport Executive
GCTA	Ghana Cooperative Transport Association
GHG	Green House Gases
GNAG	Ghana National Association of Garages
GPRTU	Ghana Private Roads Transport Union
GRTCC	Ghana Road Transport Coordinating Council
GUMAP	Ghana Urban Mobility and Accessibility Project
GUTP	Ghana Urban Transport Project
HVT	High Volume Transport
ICEV	Internal Combustion Engine Vehicle
MLGDRD	Ministry of Local Government, Decentralization and Rural Development
MMDAs	Metropolitan, Municipal and District Assembly
MoRH	Ministry of Roads and Highways
MoT	Ministry of Transport
NRSA	National Road Safety Authority
OEM	Original Equipment Manufacturer
PROTOA	Progressive Transport Owners Association
SKD	Semi Knocked Down
VADUG	Vehicle and Asset Dealers Union of Ghana
WHO	World Health Organization

1. Introduction

1.1 Context of Study

This study was commissioned by the Strategic Partnership Technology in Africa (SPTA), a network of German development cooperation and over 200 European and African companies. Its aim is to develop public-private cooperation projects with a focus on future-oriented technologies in African countries. The network was launched by the Federal Ministry for Economic Cooperation and Development (BMZ) in 2017 and is coordinated by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. One of SPTA's focus topics is sustainable mobility and logistics. Together with companies from the mobility sector, various project studies and innovative business ideas in African countries have been developed within SPTA to date.

In line with SPTA's focus, this study sought to contribute to Ghana's mobility sector. While demand for mobility on the African continent is incessantly increasing, existing transport options are often either inconvenient and unsafe or unaffordable for large parts of the population. In addition, skills shortages hamper the development of the mobility industries in many African countries. To provide better and more affordable mobility options for people and goods, the development of new mobility services such as private or corporate car sharing, shuttle services, ride-hailing, and delivery services is worth considering.

1.2 Objectives

To promote the development and deployment of new mobility services in Ghana, a detailed understanding of the local market context is required. SPTA therefore sought to gain further insights into opportunities and current barriers for mobility services in Ghana through a market study. The scenarios and clear recommendations derived from the study results should provide the SPTA as well as private companies – such as the ones organized in the Pan- African Mobility Alliance (PAMA), as well as the broader public – with a comprehensive assessment of and guidelines for developing future cooperation initiatives in the mobility services sector in Ghana and beyond. The study is organized in three parts:

- Part 1 - An assessment of the Ghanaian mobility services sector (status quo)
- Part 2 – An assessment of the regulatory environment in Ghana and labour market requirements
- Part 3 – An estimation of market potential, clients, and user groups for new mobility services in Ghana.

This **Final Report** presents the main highlights of Parts 1, 2 and 3. Recommendations on projects that could be piloted are also presented. These recommendations are the result of considerations emerging from the study, including focus group discussions and stakeholder engagements.

1.3 Methodological Approach

The methodological approach to the study comprises the following:

- **A review of existing literature and regulatory documents** such as policy documents, reports, studies, etc
- **Semi-structured interviews with stakeholders from both the public and private sector:** Public stakeholders included actors from the regulatory point of view, such as, the Ministry of Energy and the Department of Transport of the Accra Metropolitan Area. Private stakeholders interviewed included representatives from the entrepreneurial sector attempting to break grounds with innovative digital and technological solutions.
- **Commuter Opinion Surveys:** A total of five hundred (500) respondents were surveyed. **These included users of both public transport (trotros, taxis, okadas, rickshaws) and private car users.** The sample also included persons with disabilities, men, women, students and the elderly. The willingness to pay, needs and interests towards new mobility services were tested.
- **Focus Group Discussions:** Findings from Parts 1 and 2 were presented to stakeholders from both the public and private sector, as well as preliminary insights gained towards Part 3. Feedback was sought on barriers, opportunities and drivers for new mobility services, as well as suggestions on pilot projects.

2. Baseline Definitions

Within the scope of this study, key concepts introduced and considered are described as follows:

Micromobility

Micromobility refers to the range of transport options that employ the use of small, light-weight devices for short trips. They are affordable, efficient and offer low-carbon emissions. They:

- Typically operate at speeds below 25 km/h (15 mph),
- Can be human-powered or electric,
- Can be shared or personally owned, and
- Are ideal for trips up to 10 km.

Micromobility is used for a variety of trip types, from short commutes to first- and last-mile connections with transit, to inter-/intra-neighbourhood trips. Examples of micromobility devices include electric scooters, bicycles, skateboards, cargo or freight bicycles (those with built-in spaces for carrying large loads), and cycle rickshaws. Mopeds and motorcycles, however, are not considered to be micromobility because they are not lightweight and have top speeds above 45 km/h.¹

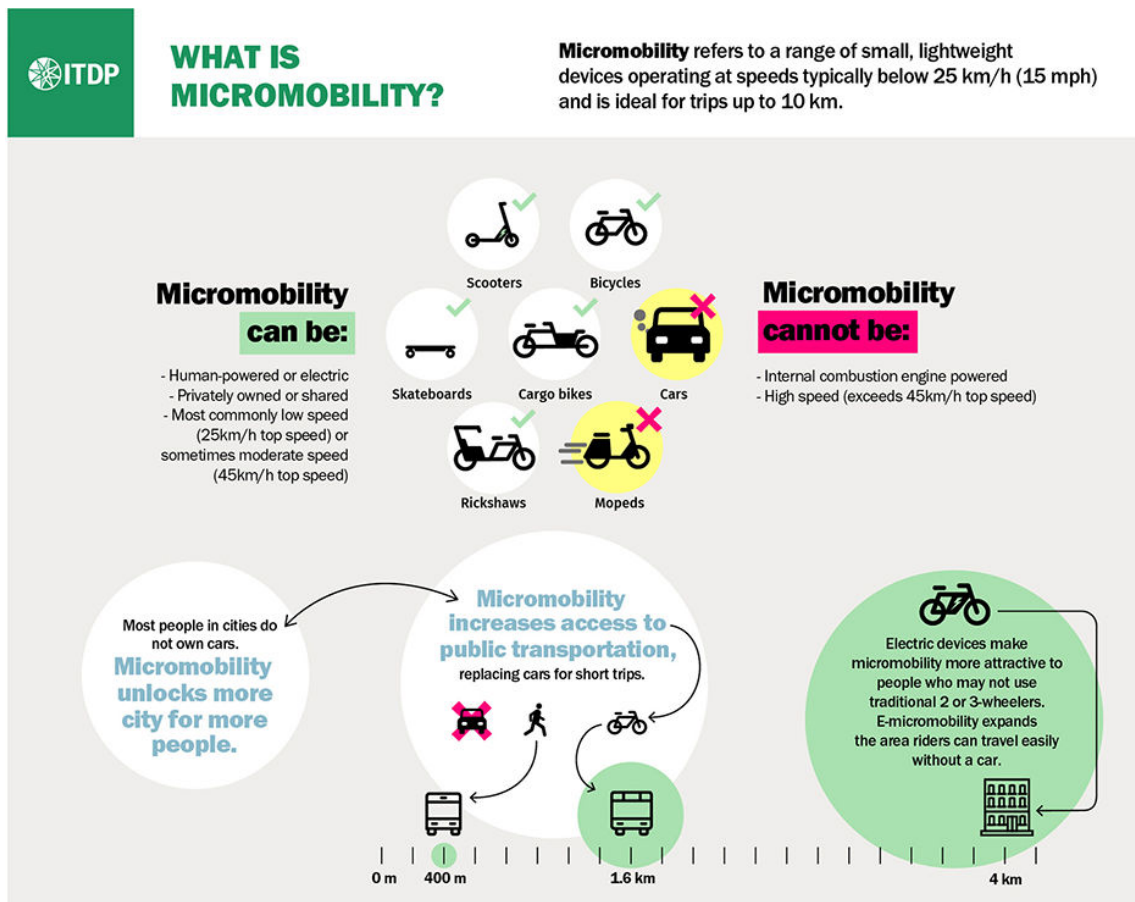


Figure 2-1: Definition of Micromobility

Source: ITDP

Mobility as a Service

Mobility as a Service (MaaS) integrates various forms of transport and transport-related services into a single, comprehensive, and on-demand mobility service. MaaS offers end-users the added value of accessing mobility through a single application and a single payment channel (instead of multiple ticketing and payment operations). To

¹ ITDP - Maximizing Micromobility: Unlocking Opportunities to Integrate Micromobility and Public Transportation; Page 5

meet a customer’s request, a MaaS operator hosts a diverse menu of transport options, including (but not limited to) public transport, active modes such as walking (walking distances/trip duration, infrastructure’ conditions, ...) and cycling, ride/ car/bike-sharing, taxi, and car rental or lease, or a combination thereof.

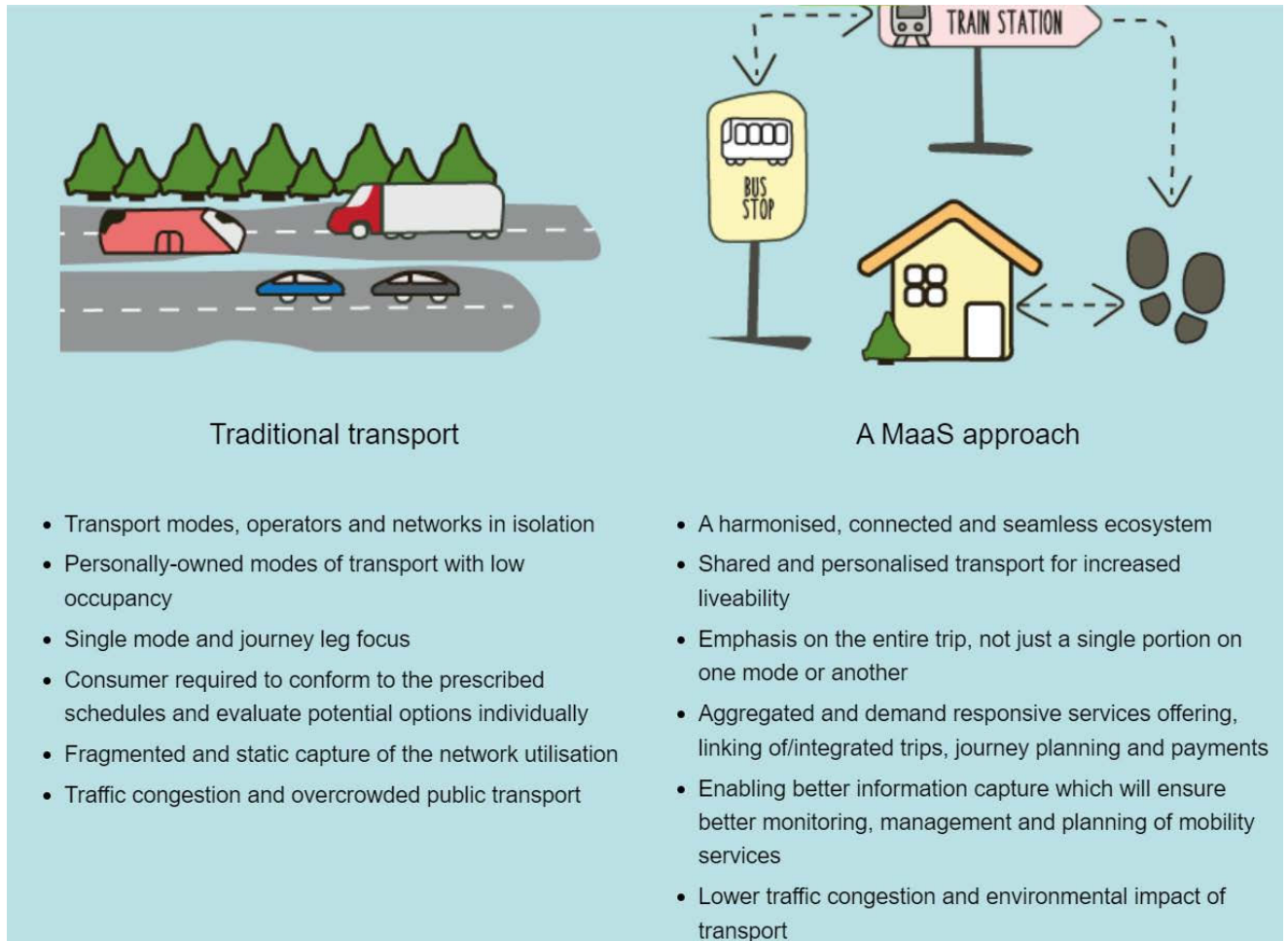


Figure 2-2: Comparison of MaaS to Traditional Transport

Source: <https://www.aurecongroup.com/expertise/urban-mobility-integrated-transport/defining-maas-mobility-as-a-service>

Shared Mobility

Shared mobility allows commuters to collectively share a vehicle on a trip or on segments of a trip (as in the case of carpooling and ride-sharing) or as a rental system that allows different individuals to make use of one vehicle at different periods. Shared mobility aims to reduce transport costs and creates a hybrid between private vehicle use and mass or public transport. This strategy allows users to access transportation services on an as-needed basis. As an umbrella term, shared mobility encompasses a variety of transportation modes including carsharing, bicycle-sharing systems, ridesharing companies, carpools, and microtransit.

Within our scope of study, mobility services for both passenger and delivery services will be considered. These means of transport may be categorized, based on how they are powered as:

- **Human-powered:** These employ the use of human muscle power and may be resorted to on the basis of cost-effectiveness, convenience, leisure, physical exercise and environmentalism. Examples include bicycles, rickshaws/tricycles.
- **Combustion engine- powered:** An internal combustion engine vehicle (ICEV) is one that uses burns fossil fuels (such as petrol, diesel, jet fuel, and compressed natural gas) or biofuels (e.g., ethanol and biodiesel) or hydrogen to generate power.
- **Electric-powered:** Unlike conventional vehicles that use a gasoline or diesel-powered engine, electric cars and trucks use an electric motor powered by electricity from batteries or a fuel cell.

3. Mobility Services in Ghana

3.1 Public Transport Services

The matrix below presents the different transport services available in Ghana.

Table 3-1: Categories of Transport Services in Ghana

		Access to vehicles		
		Public	Parapublic	Private
Use of vehicles	Collective	Bus	Minibus Motortaxi E-motor taxi	Shuttle service (Hotels, airport, churches)
	Semi-collective		Carpooling Ride-sharing	
	Individual	Bike-sharing system	City taxi Ride-hailing taxi Car rental Bicycle rental	Private car Bicycle Corporate Car-sharing

The figure below places them in relation to their capacity (number of passengers carried) and average trip distance. We can see that capacity is proportional to the distance travelled, which is a usual characteristic of public transport. The matrix also shows the good variety of services in major cities, although minibuses (trotros) represent the majority of trips.

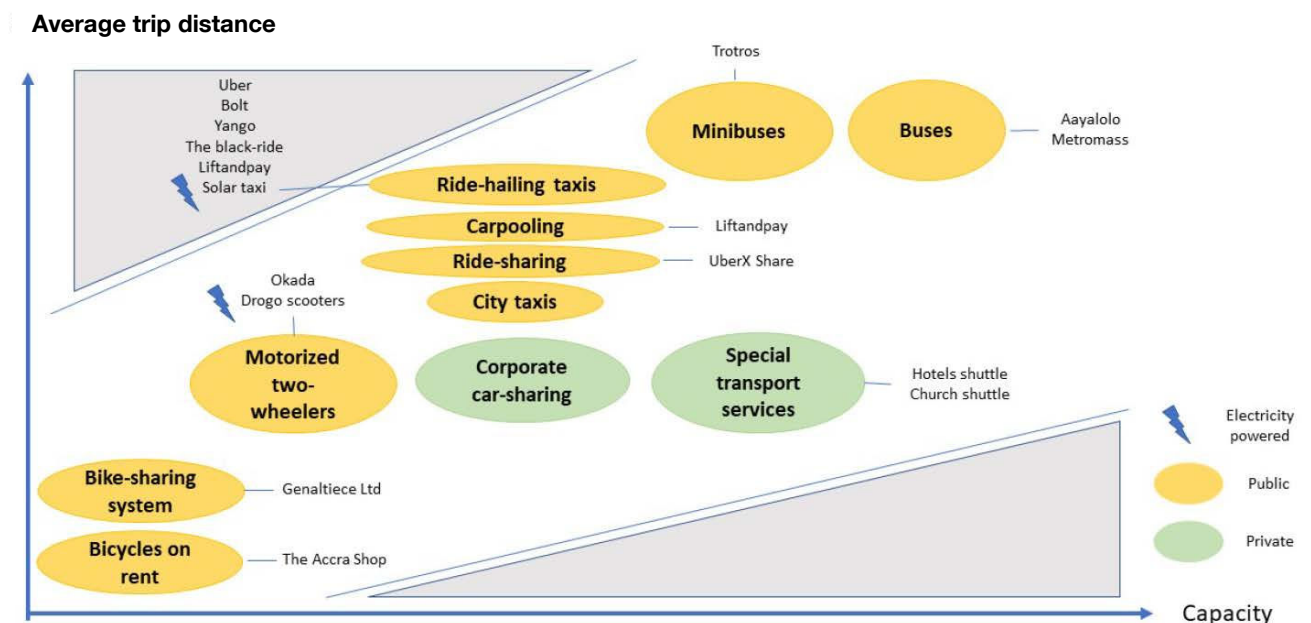


Figure 3-1: Public Transport Services in Ghana in Relation to Capacity and Average Trip Distance

Following the review of the status quo of mobility services in Ghana, it is noted that the major means of transport for both passengers and freight in Ghana is road transport. Public transport is the most important mode of transport in Greater Accra and Kumasi. It provides about 50% of all trips². Additionally, *trotro*, an informal collective public transport system with bus seating capacity, ranging anywhere from 12 – 23-seater, is a popular means of transport

² Source: Ghana Urbanization Review Phase 1 report

among Ghanaians. There are also formal public transport services such as Metro Mass (which runs mostly intra-city) and Aayalolo (limited routes within Accra). In terms of affordability, it is noted that the trotro service is generally more affordable in comparison to digitally-enabled mobility services (i.e. taxi apps such as Uber, Bolt, Yango, as well as car-pooling, car-rental and bike-sharing/renting services).

These digitally-enabled mobility services complement traditional public transport services, and have become an attractive and convenient alternative for reasons such as:

- For security reasons, it is possible to share ride details with friends and family/others so that they can track your trip.
- Total travel cost can be split amongst other accompanying passengers (i.e., known by and accompanying the passenger who requested the ride).
- It is faster (no fixed route) with no undesirable stops to pick up other unknown passengers on the way (except for if one is using a service like UberX Share, which allows for this as a car-pooling option).
- It is easier to trace lost items in a vehicle by either reporting or calling the driver who served the ride.
- There is convenience of leg room and space for luggage.

3.2 Delivery Services

The figure below classifies existing delivery services in Ghana, depending on their capacity (size of the vehicle) and their coverage area. We can see that capacity is proportional to the distance travelled. The matrix also shows the restricted variety of services, although companies specialised in items and food delivery (mostly through 2-wheelers) are many: Jumia, Uber, Glovo, ShaQexpress etc.

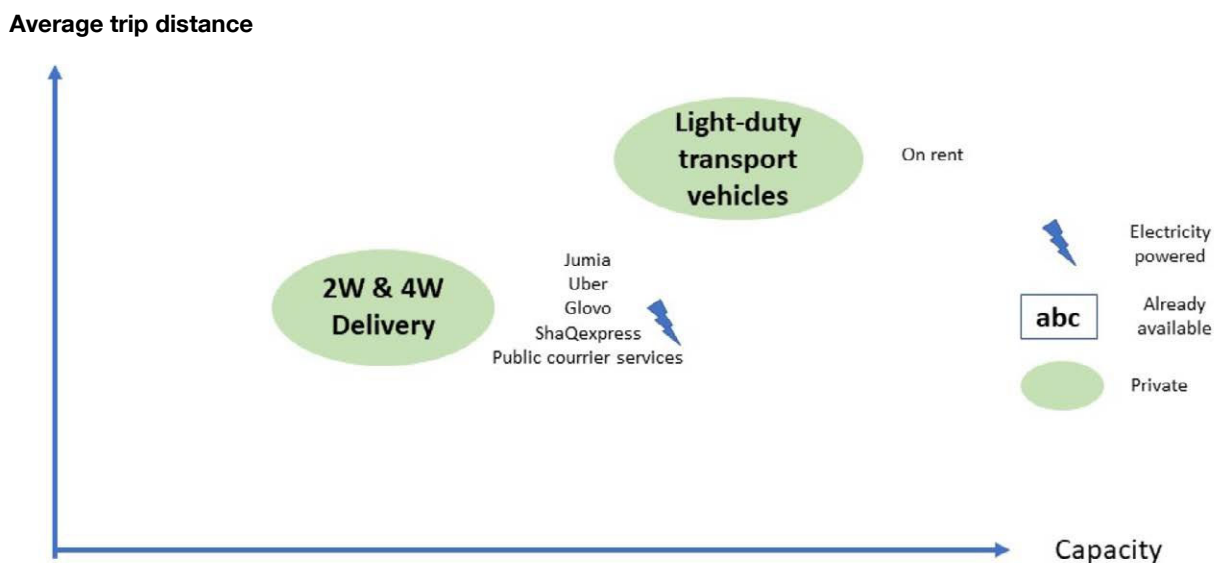


Figure 3-2: Freight and delivery services in Ghana

4. Key Learnings from Assessing the Status Quo

Through the review of existing literature such as policy documents, reports and studies, an assessment of the market situation, competitive landscape and regulatory status quo of mobility services in Ghana was conducted (See “References” list on Page 52, as well as Appendices 1 - 5). The main key learnings drawn from this are categorized and presented as follows:

Urban Mobility

- Ghana’s population has grown to 30.8 million, now a five-fold figure since the first post-independence census was conducted in 1960.
- Rapid urbanization and high population growth give rise to an increased need for mobility.
- A national motorization rate of about 70 vehicles per 1,000 inhabitants, and 240 vehicles per 1000 inhabitants for Accra. As a matter of comparison, Kenya stands at 27 veh/1’000 inhabitants at the national level, and 96 in the main city. The most important gap is observed in Ethiopia, where motorization at the national level (6 veh/1’000) is 21 times lower than the average in the main city (130 veh/1’000). (see Appendix 1)
- Motorization trends are on the rise due to the inefficiencies of the public transport sector.
- Although 68% of road users travel by trotro/buses, trotros occupy less than 30% of road space usage, while private vehicles carrying only 14% of passengers account for 33%.
- Chronic congestion has grave impacts on the socio-economic well-being of the population.

Existing Urban Mobility Services

- Informal public transport (trotro) in Accra accounts for nearly 70% of work trips, while auto-trips account for at least 20%.
- Although not legalized for commercially carrying passengers, there is an undeniable latent demand for the motor-bike service.
- Digitally-enabled mobility services and e-commerce activities experienced a boom during the COVID-19 pandemic and continue to be a preferred option for convenience.
- Costs, revenues, and profitability/viability of public transport are determined by factors such as average seat turnover, vehicle headway, and number of round-trips that a vehicle can make within a day.
- According to DVLA data, out of the 2.8 million registered vehicles registered as at 2021, 72% are powered by petrol engines, 27% by diesel engines and less than 1% by LPG and other energy sources.
- The Ministry of Transport is currently working on an E-mobility Policy to guide the deployment and scale-up of electric vehicles in the country.
- Mobility services must account for all segments of the population including women and persons with disabilities.
- Affordability is key for inclusive mobility.

Transport Related Policies and Governance in the Transport Sector

- The National Urban Policy (NUP) of 2012, Ghana Automotive Development Policy (GADP) of 2019, National Urban Transport Policy (NUTP) of 2020, and National Electric Mobility Policy of 2022 have all been recently issued or updated which shows the willingness of government to set up a framework to enable and fast-track the development of urban mobility in Ghana.

- Both the NUTP and the NUP deal with urban mobility, which demonstrates the functional overlap between the Ministry of Transport and the Ministry of Local Government, Decentralization and Rural Development. Both Ministries make recommendations towards the improvement of transport services and regulation of the sector. This overlap is well-known to the authorities, but no coordination mechanism has been put in place so far.
- The NUP makes mention of the need for cleaner and efficient technologies, as well as the adoption of smart tools, whereas the NUTP focuses more on the regulatory aspects as well as intermodal integration and standards for rolling stock.
- The Ghana Automotive Development Policy (GADP) is a great step to set-up Ghana as a national and regional hub for automotive manufacturing and improve safety and emissions standards of vehicles.
- A framework for the deployment of Electric Vehicles (EVs) has been set but major barriers still need to be lifted, and sector-specific regulations will need to be implemented.³

Vehicle Import Regulations

- 70% of imported vehicles in Ghana are used vehicles, mostly from the United States, Japan and Germany.
- Import duty for motor cars can go up to 20% of purchase price for a cylinder capacity exceeding 3000cc. Motor vehicles designed to carry ten or more persons (buses for instance) benefit from a 5% import duty, while motor vehicles of a capacity of 30 persons or more are exempted (See Appendix 2).
- Since the 2000 Customs Amendment Act, vehicles older than 10 years are completely banned. However, regulations have not yet been defined, and the penalty system still prevails.
- Through the GAPD, Ghana is trying to attract leading OEMs. Volkswagen, Nissan, Toyota and Suzuki have already signed assembly agreements.

Fuel Quality, Emission Standards and Fuel-Efficiency Policy

- In 2017, Ghana was the first West African country to move to low sulphur diesel and with a new sulphur content standard of 50 parts per million (ppm), down from 3,000 ppm. However, the nation's refinery is not yet ready to comply with this standard.
- Ghana is equipped with a fuel authentication solution since 2013 (Authentix), which ensures quality of petroleum products as well as appropriate recovery of fiscal tax revenues.
- There is currently no enforcement of emission performance standards and vehicle tests are only conducted for advisory purpose and data compilation. Ghana has adopted the Euro 4 standard for it fuel, but manufacturers are yet to ensure Euro 2 emissions system limit.
- Over the years, Ghana has seen an improvement in fuel economy, as the average age of light-duty vehicles (LDVs) has come down from 5,7 in 2005 to 5 in 2016, corresponding to significant fuel economy and reduction in related CO₂ emissions (See Appendix 3).

Transport Market Regulation

- The first regulations of public transport at the local level dates back 2012. It is a major milestone, as it creates DoTs and sets procedures for the registration and granting of licenses to operators. It

³ Ghana's National Electric Policy Framework is downloaded at <https://unepccc.org/wp-content/uploads/2022/06/national-electric-mobility-policy-framework-ghana-final.pdf>

also prohibits the use of 2- and 3-wheelers for commercial purposes (except for courier and delivery services).

- Following the publication of the GADP, the Customs Amendment Act was amended to grant a rebate on import duty for automotive manufacturers registered under the Ghana Automotive Manufacturing Development Program (GAMDP).
- The National Road Safety Authority (NRSA), which was previously a commission, is yet to publish its regulations. This document will be key to understand the role that this new stakeholder will play in the mobility sector, its coordination with the existing entities (especially Greater Accra Passenger Transport Executive [GAPTE]) and its relation to new mobility services.

Permits and Charges

- The L.I 2180 sets common requirements for trotro, taxi and bus operators in terms of licences, testing of the vehicle, registration with a union etc.
- Fees for licences and certificates are set by the Driver Vehicle and Licensing Authority (DVLA) at the national level, while remaining charges are fixed by the Metropolitan, Municipal and District Assemblies (MMDAs) [See Appendix 4].
- Ride-hailing services are subjected to DVLA’s charges but do not need to register with the Assembly.

Average Incomes for Support Staff and Drivers

- The average daily wages of trotro, okada and city taxi drivers are higher than the daily minimum wage in Ghana (GHC 13.53) but it corresponds to an average of 11 to 15 working hours. Drivers of ride-hailing services have a higher income.
- While information on income of executives and management team is not readily available, the available reference is the Ghana Living Standards Survey, which gives an idea of the mean annual per capita income of the highest quintile (248 EUR at the national level, 562 EUR in Kumasi).

Influence of Unions and Associations

- The trotro and taxi business is in the hands of well-established unions (GPRTU, PROTOA, GCTA) which brings a certain level of order and stability to the system; although the number of “floaters” , (i.e., drivers not registered with unions) continue to rise.
- Unions are represented by the Ghana Road Transport Coordinating Council (GRTCC).
- Drivers of ride-hailing services are represented by the Ghana Online Drivers Union. Recent strikes were organized in 2022, with drivers protesting against growing insecurity, attacks on drivers, high service charges (25%) and lack of flexibility of the app.
- The 2 major registered automobile associations in Ghana are the Automobile Dealers Union of Ghana (ADUG) and the Vehicle and Asset Dealers Union of Ghana (VADUG).

These key learnings led to a first exercise of identification of preliminary findings and gaps, which are summarized below in an initial SWOT analysis (Strengths/Opportunities and Weaknesses/Threats).

Table 4-1: SWOT Analysis of Preliminary Findings

Strengths/ Opportunities	Weaknesses/ Threats
<ul style="list-style-type: none"> ■ Presence of different mobility services and the perception of increasing usage. ■ The trotro industry provides transport services at no cost to the state. ■ The presence of flexible and demand-responsive modes of transport. ■ Potential support from development finance institutions. ■ Presence of international NGOs/initiatives in the field of urban mobility / road safety. ■ Building on the development of mass rapid transit systems (e.g. by planning Transit Oriented Development). ■ Leveraging to flexibility of trotro services and new mobility services to create a multimodal system. ■ Local taxes not fully taken advantage of (e.g. inefficient taxing of trotro operators). ■ Improving access to financing for mobility services operators and unlocking the potential for a fleet renewal program. ■ Professionalization of operators to improve upon the industry. ■ Involving citizens in the discussions of urban mobility projects and services and creating a forum for public discussions on this subject. 	<ul style="list-style-type: none"> ■ Lack of coordination between ministries and agencies ■ Lack of connectivity between modes and focus on individual cars. ■ Focus on hard infrastructure at the expenses of other dimensions of mobility. ■ Inconsistent delivery services and low quality of service for the user. ■ Low standards regarding vehicle characteristics. ■ Lack of enforcement of regulations. ■ Difficulty in obtaining financial support. ■ Generation of negative externalities (such as environmental and road damage, accidents, congestion, and oil dependence) due to a lack of regulation of the public transport sector. ■ Absence of interest groups representing transport users in general (public transport, road users, pedestrians, other). ■ Continuous increase in car ownership creating gridlock situations. ■ Difficulty in implementing well-planned mass transit infrastructure and services. ■ Race to the bottom as a result of competition and the multitude of actors.

5. Key Learnings from Surveys and Interviews

Besides literature review and the assessment of regulatory aspects, the methodological approach adopted in this study also involved the conduct of Commuter Opinion Surveys and Semi-structured Interviews. This section presents some main highlights from these fieldwork activities. The full presentation of key findings from the opinion surveys and interviews are shown in Appendix 6 and 7 respectively.

5.1 Commuter Opinion Survey

Box on Commuter Opinion Survey Conducted

- The opinion survey was conducted for a period of five days with four field researchers at different locations and a target of **500 respondents**.
- **The survey included users of both public transport (trotros, taxis, okadas,) and private car users.**
- The strategy adopted **ensured an inclusive and non-biased survey by interviewing different transport users with demographics at different locations.**
- Referring to statistics from the 2010 Population Census, the sample space was determined to reflect Ghana’s demographic characteristics and comprised of 56% female, 44% male and 3% persons with disability.
- **The locations for each survey were selected, prioritizing areas with high pedestrian traffic, terminals, car parks, malls, schools, banks and the target respondent.**

Table 5-1: Main Outputs from the Users’ Satisfaction Survey

Users’ perspectives: outputs from the survey	
Strengths/Opportunities	Weaknesses/Threats
<ul style="list-style-type: none"> ■ Almost 85% were undertaking their surveyed trips by public transport, 12% by private cars and about 4% by walking. ■ Around 70% of respondents indicated that they were either happy or very happy with wait times associated with their respective means of transport. ■ About 44% of respondents were either unhappy or very happy with comfort for their respective mode of transport. ■ About 16% of respondents indicated being either unhappy or very unhappy with accessibility related to their mode of transport. ■ When asked about the preferences regarding the potential use of new mobility services: 35% ride-sharing; 34 % car-sharing; 25% on-demand services; 5% no new service; 1 % Leasing, rental or sharing of Light-duty vehicles. 	<ul style="list-style-type: none"> ■ Nearly 90% of respondents were either unhappy or very unhappy with their transport costs. ■ 80% of respondents expressed that there should be a reduction of fare/transport cost. ■ Around 80% of respondents would be unwilling to pay more for new mobility services.

5.2 Viewpoints from Conducted Interviews

The views of various stakeholders in both the private and public sectors were sought as part of the semi-structured interviews conducted. Stakeholders were organized in four sectors/groups as presented in the table below.

Table 5-2: Categorization of Interviewed Stakeholders

Sector	Entities Interviewed
Ride-hailing and micromobility service providers	Uber, Black Ride, Lift & Pay, Drogo Scooters
Delivery service providers	Jumia, ShaqExpress
Resellers/Manufacturers	Volkswagen, Cargo Bikes, Solar Taxi
Public transport sector	Ministry of Transport, Accra Metropolitan Authority Department of Transport

Three main thematic areas were explored during the interviews:

- Theme 1 – Policy and governance toward current mobility
- Theme 2 – Socioeconomics and organization of the sector
- Theme 3 – Market potential, clients and user groups for new mobility services

On Theme 1 – Policy and governance toward current mobility – stakeholders from both the public and private sectors acknowledged that government is making efforts towards the adoption of new mobility services. However, more effort was required in setting up an implementable policy, regulatory and regulatory framework to support such services.

On Theme 2 – Socioeconomics and organization of the sector – private sector ride-hailing providers explained how various forms of discounts are provided to passengers and paid in other forms to the driver, as incentive for usage. Additionally, a fare system based on distance travelled as well as total trip time is adopted. Nonetheless, with rising operational costs such as fuel and app maintenance, revenues are impacted. E-commerce companies like Jumia engage third-party logistics (3PL) companies to deliver purchased goods to customers. There is an understanding of the value chain and the need to include these third-party delivery companies as part of operations.

On Theme 3 – Market potential, clients and user groups for new mobility services – private sector stakeholders acknowledged that there is indeed a potential market for new mobility services, including the adoption of electric vehicles (EVs). However, there were barriers to their operation and penetration that needed to be addressed.

Tables summarizing the main takeaways from the interviews, organized per sector and thematic areas are presented in Appendix 9.

6. The Case for EVs

Technology has impacted transportation, stimulating the emergence of new mobility services to ensure a more efficient transportation system, cleaner air, and an overall better quality of life.

Global moves towards electric vehicles (EVs) have been profound. Many countries are adopting measures in three broad areas: i) price subsidies, ii) tax breaks and iii) a range of privileges on road use, for example, EV use of bus lanes, free or reserved parking, charging and other facilities. The adoption of innovative transport solutions in any society is made easier within an enabling governance and regulatory framework. This stimulates initiatives by start-ups and attracts investors.

In Ghana, some steps are being taken towards the adoption of e-mobility within both the private and public sectors. In October 2019, the Energy Commission in collaboration with the Ministry of Energy, launched the Drive Electric campaign to promote the alternative and productive use of electricity -beyond Ghana's business-as-usual case of industrial, commercial and residential uses, to power vehicles and contributing towards meeting climate targets. The main objectives of the Drive Electric Campaign were to:

- Introduce and promote the use of electric vehicles as alternative means of mobility in Ghana.
- Create demand beyond the business-as-usual levels and enable the productive and sustainable utilisation of excess capacity and drive electricity demand and utilisation.
- Have at least one hundred (100) electric vehicles and at least 10 public charging outlets in Ghana by 2020

The Ministry of Transport has also recently published the National Electric Mobility Policy Framework intended to guide the deployment and scale-up of electric vehicles, charging infrastructure, research and development and service delivery.

Within the private sector, electric 2- and 3-wheelers (bikes, bicycles, cargo bikes or tricycles), have been adopted by few companies in Ghana, such as ShaQ Express and Jumia. These are reported to help them reduce their operating costs as well as GHG emissions. The two electric bicycles that ShaQ Express is currently piloting were purchased from CargoBikes and have an autonomy of 70km. Maintenance is cheaper than a regular motor bike, and speed is comparable (45-50 km/h). Companies pay between 30 and 40 GHC everyday to use an e-bike.

The analysis conducted allows to highlight the following:

- A coordinated and collaborative approach between all actors – both public and private will be useful for creating the environment that allows new mobility services to thrive.
- The general public must also be open to new and seeming disruptive technologies and mobility services that will eventually integrate, and in some cases, replace conventional transport modes.

6.1 Feasibility of EV Adoption

EVs are two to three times more energy-efficient than conventional petrol-powered vehicles and have no tailpipe emissions. However, the reduction of GHG emissions depends on the mix of generation sources on the grid used to charge them. In some cases, EVs could add substantial GHG emissions if they are charged primarily with fossil fuel-based generators.⁴

The promotion of electric two -wheelers seems to be a more feasible option for the adoption of EVs in the Sub-Saharan region compared to four-wheelers. Two-wheelers have a smaller battery, which allows for charging via a mini-grid. This makes it suitable for use in locations with low access to reliable electricity-grid infrastructure.

⁴ <https://www.wri.org/initiatives/electrifying-vehicles>

Feasibility of electric-vehicle adoption in sub-Saharan Africa

● High ● Medium ● Low

	Two-wheelers	Passenger cars (for personal use)	Passenger cars (for commercial use – taxis)	Light commercial vehicles	Minibuses
Primary use (commercial or personal)	90% of all two-wheelers are for commercial use, traveling 90–130 km per day	Personal use, traveling 20–40 km per day	Commercial use (taxis), traveling up to 100 km per day	Commercial use, traveling over 100 km per day	Commercial use, traveling over 100 km per day
Charging infrastructure required	Battery swap stations or Level 1 at-home charging	Level 1 at-home charging sufficient in most cases	For some drivers and routes (traveling less than 100 km per day), Level 1 or 2 charging is sufficient DC fast charging required for full coverage		
Ability to charge	Drivers have time to make battery swaps, charge at home, or publicly charge	Most owners have access to electricity at home and are able to charge overnight	Able to charge overnight; limited time to charge during the day, which is required for going longer daily distances		
Up-front cost of EV/ICE²	Current models are 30% more expensive, but R&D expected to bring down cost	Approximately 20–30% more expensive for new vehicles Used EVs not yet available so unable to compete with used ICE vehicles on purchase price			
TCO³ EV/ICE	More favorable for EVs, even in countries with high electricity costs				
Buy used/new	Mostly new	Mostly used (>80% of all sales)		New and used	Mostly used
Overall assessment	●	●	●	●	●

Figure 6-1: Feasibility of EV Adoption in Sub-Saharan Africa

Source : Pg 9 – Exhibit 3; McKinsey Center for Future Mobility – Power to move: Accelerating the electric transport transition in sub-Saharan Africa.

Box on the energy mix in Ghana

This box presents the energy mix in Ghana, including impact assessment on the capacity of electric cars on the electric grid of the country.

- Ghana’s electricity generation sources are hydro, thermal (crude oil, natural gas, heavy fuel oil and diesel) and renewables (solar and biogas). (Refer to Appendix 10)
- Electricity generation capacity has been increasing over the last few years. This is as a result of the coming onstream of new capacities from thermal and renewable sources year-on-year.
- In 2020, the energy mix remained relatively stable with hydro contribution 29.9% of total installed capacity.
- Conventional thermal plants contributed 69.0% of the total installed capacity in 2020, while renewable sources accounted for 1.1%.
- Thermal has surpassed hydro as the most dominant source of electricity generation in Ghana since 2015.
- For the past five years, Ghana’s system peak demand has been increasing at an annual growth rate of 10.3%.
- The system peak demand in 2020 was 3,090 MW, which was about 10.2% more than 2019 system peak demand.
- Peak load excluding export (domestic load) was 2,682 MW; a marginal increase of 0.7% over 2019 domestic peak.
- The total energy consumed including losses was 19,717 GWh as against the projected of 19,685 GWh. A total of 17,887 GWh was consumed during the same period in 2019.

- Hydropower and thermal plants are projected to generate 7,001 GWh (32.9%) and 14,112 GWh (66.4%) of total electricity supply in 2021.
- The remaining supply of 152 GWh, representing 0.7%, is expected to be met by other renewables, including solar PV and biogas.

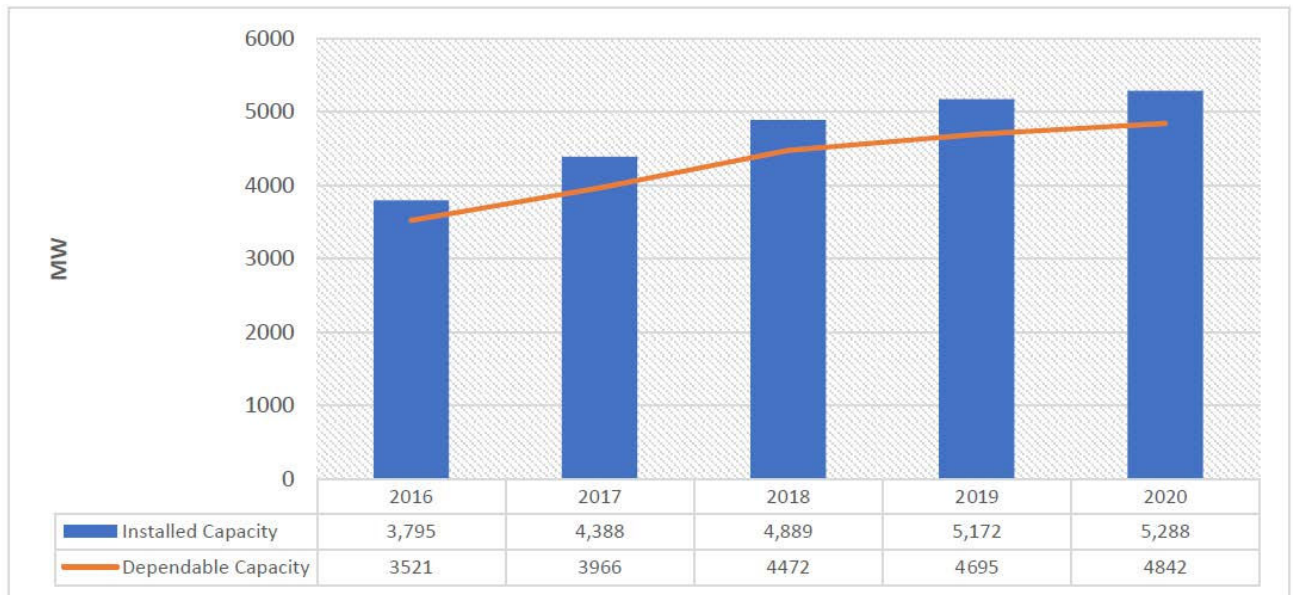


Figure 6-2: Installed and Dependable Capacity from 2016 - 2020

7. Analysis of Current and Potential Future Demand and Supply

7.1 Current Passenger Demand

This section aims at providing insights on the current demand regarding exclusively passenger transportation, based on available data. The same exercise is not possible for freight transportation given the lack of information.

Summarized below is the key information regarding mobility trends in Ghana and in Greater Accra, which serves the purpose of estimating the current demand, its quantification and qualification. An important work of source confirmation and reliability was conducted.

Table 7-1: Key Information on Mobility in Ghana and Greater Accra

Population (Ghana, 2021)	30.8 million
Population (Greater Accra, 2021)	5.4 million
Motorization rate (Ghana, 2015)	70 vehicles/1000 inhabitants
Motorization rate (Greater Accra, 2015)	240 vehicles/1000 inhabitants
Number of trips/day (Ghana, 2020)⁵	48.4 million
Number of trips/day (Greater Accra, 2022)⁶	10.2 million

Regarding the available information on modal share for Greater Accra presented hereafter:

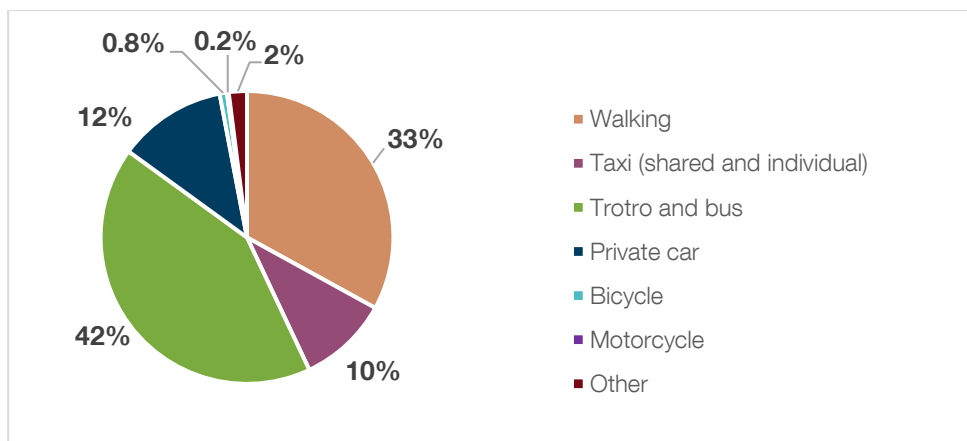


Figure 7-1: Modal Share in Accra (2007)⁷

Although this information refers to Greater Accra, it allows to have an idea of the mobility patterns in cities in Ghana.

7.2 Potential Future Passenger Demand

An estimation of the future demand was exclusively conducted for passenger transportation, for Greater Accra, given the available data. The estimation in terms of the number of daily trips and motorized daily trips for 2025, 2030 and 2035 is from Greater Accra Master Plan (2014). The estimation of daily trips and motorized daily trips for 2022 uses

⁵ Estimation presented in KOICA Master Plan for Greater Accra, 2014

⁶ Round Estimation based on the estimation hypothesis presented in KOICA Master Plan for Greater Accra, 2014 and the population data from the 2010 and 2021 Household Surveys

⁷ Ghana Urbanization Review Phase 1 report, 2007

the same parameters as the Greater Accra Master Plan (2014) applied to the population data provided by the National Household Surveys results for 2021.

By applying the modal share, it is possible to have an idea of the amount of trips in public transport and private vehicles. This is presented in Table 7-2 below. Additionally, Appendix 11 presents in detail, a potential future demand sensitivity analysis.

Table 7-2: Estimation of the Potential Future Passenger Demand

	2022	2025	2030	2035
Total daily Trips (1)	10 245 000	11 505 000	13 104 000	14 700 000
Total Motorized Daily Trips (1)	7 171 500	8 053 500	9 172 800	10 290 000
Public Transport Vehicle Daily Trips (64%) (2)	4 589 760	5 154 240	5 870 592	6 585 600
Private Vehicle (PV) Daily Trips (36%) (2)	1 652 314	1 855 526	2 113 413	2 370 816

Estimations with data from 1) 2016 Koica Master Plan; 2) Ghana Urbanization Review Phase 1 report

7.3 Supply of Public Transport services

Similar to the matrix shown in Figure 3-1, the following figure highlights which services are inexistent and which services could be further developed.

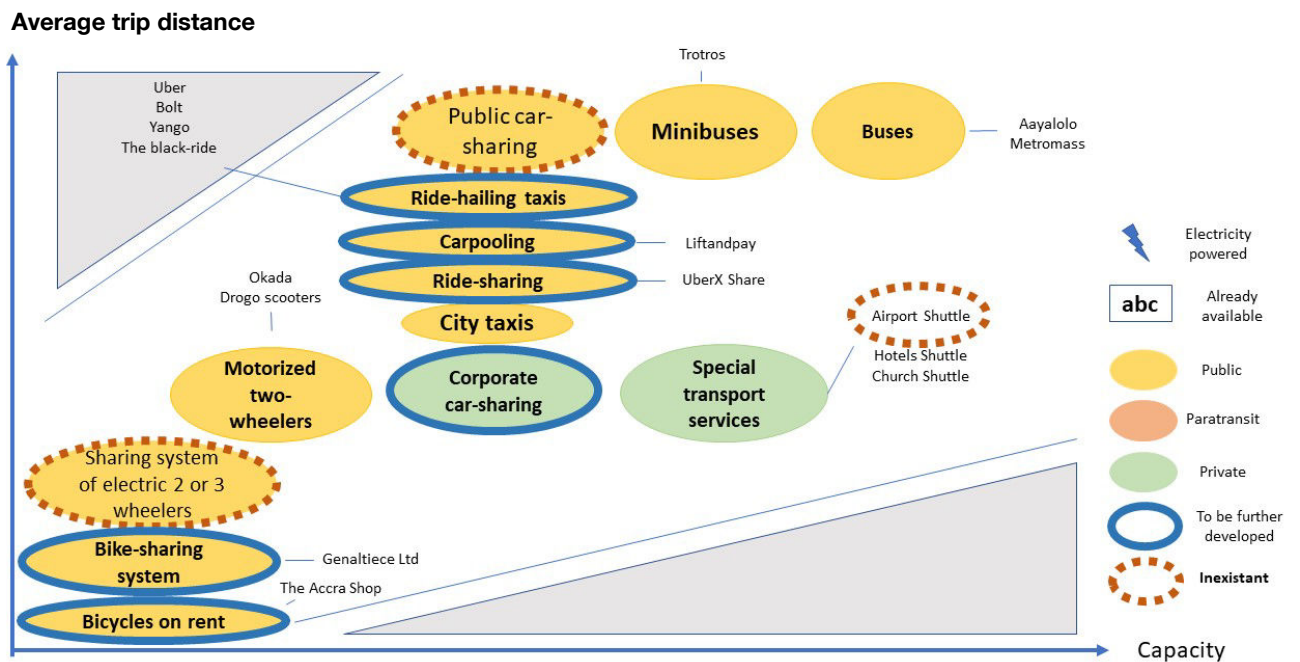


Figure 7-2: Public Transport Services in Ghana with Potential to be Developed

- **The matrix highlights the absence of and potential for 3 types of services:**
 - Public car-sharing;
 - Sharing system of electric (and non-electric) 2 and 3 wheelers;
 - Airport shuttles to major terminals and urban centres: Accra central, Madina, Teshie, Tema, Lapaz.
- **But beyond that, there are existing services that are currently circumstantial and that would deserve to be scaled-up or services that exist and that could address a specific user need:**
 - Bicycles on rent

- Corporate car-sharing
- Carpooling
- Ride-hailing taxis adapted for people with disabilities and small cargo transportation
- **The matrix calls for 2 actions:**
- Strengthening existing services whenever relevant, including mass transit modes, which are the backbone of passengers’ transport networks;
- Developing non-existing services to fill the gap and increase accessibility in Ghanaian cities.

The scope of the study refers to mobility services using small-medium capacity vehicles. Proposing a mass transit system for Accra, although it is highly required, is not within the scope of the current study.

7.4 Supply of Delivery Services

Similar to the matrix shown in Figure 3-2, the following figure highlights services which are inexistent, as well as those which could be further developed.

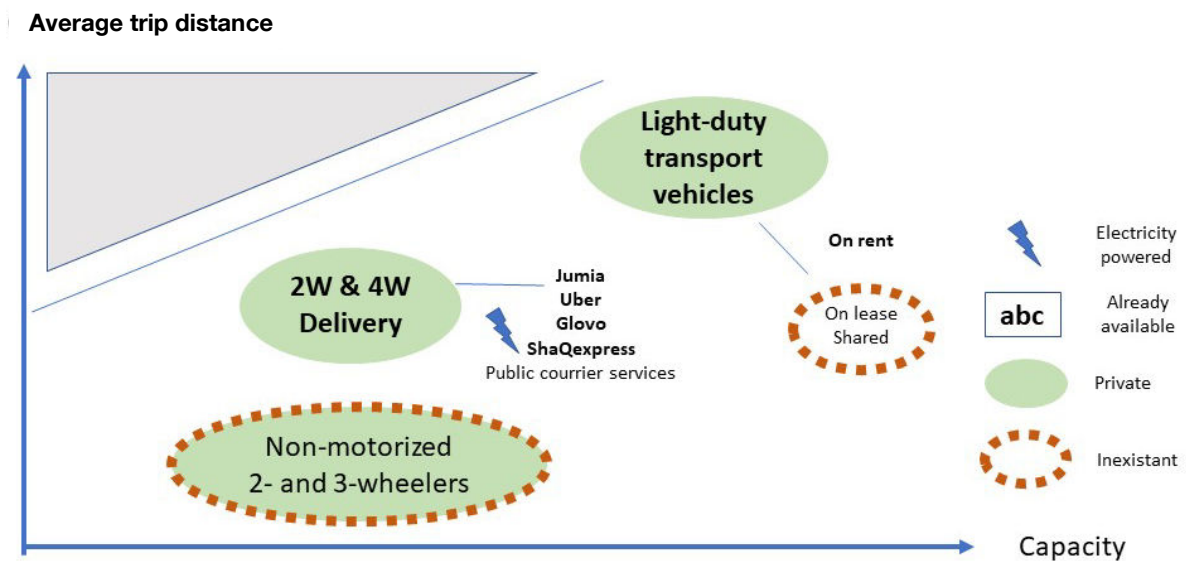


Figure 7-3: Freight and Delivery Services in Ghana with a Highlight on the Inexistent Services

The matrix highlights the absence of and potential for 3 types of services:

- **Non-motorized 2 wheelers:** for trips of less than 3 kilometres, on a flat surface, bicycles are a viable alternative to motorized 2-wheelers.
- A specific survey on the willingness of companies to adopt such mode must be conducted. This survey shall also estimate the average trip distances of delivery companies (including restaurants).
- **Non-motorized 3 wheelers.**
- **Light-duty vehicles on lease or an a shared-basis.**

But beyond that, there are **existing services that are currently considered circumstantial and that would deserve to be scale-upd:**

- **Electric 2- and 3-wheelers** (bikes, bicycles, cargo bikes or tricycles), already used by few companies in Ghana, such as ShaQ Express or Jumia, and which help in reducing operating cost as well as GHG emissions.

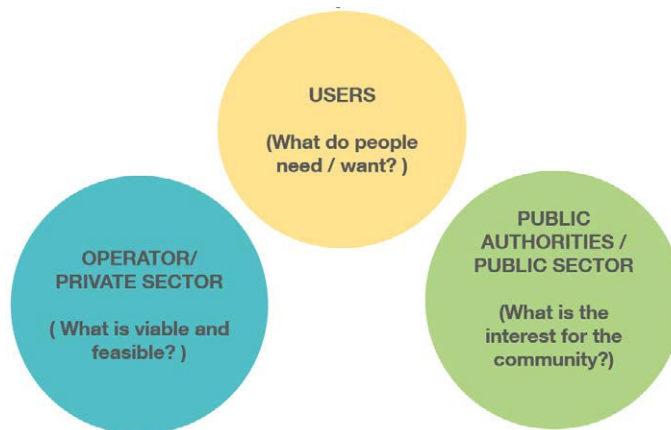
The two electric bicycles that ShaQ Express is currently piloting were purchased from CargoBikes and have an autonomy of 70km. Maintenance is cheaper than a bike, and speed is comparable (45-50 km/h). Companies pay between 30 and 40 GHC everyday to use a bike.

The International Climate Initiative funded by the federal German government through the Ministry of Environment, is also piloting “made in Ghana” electric cargo bikes, through a partnership between Impact Hub Accra and Siemens Stiftung.

8. Development of Scenarios

8.1 Perspectives and Objectives

Based on perspectives and strategic objectives for three concerned pillars: the users, the operators / private sector, and the public authorities / public sector, scenarios were developed based on identified drivers and barriers. These strategic objectives, as well as barriers to new mobility services, are summarized in Appendices 8 and 9 respectively.



Each interest group has different perspectives and, therefore, objectives, as graphically displayed below.

Figure 8-1: Stakeholders Concerned by Mobility Services

The general perspectives are summarized in the figures presented hereafter, structured around drivers and barriers for each pillar, which are subsequently translated into objectives.

Users' Perspectives and Objectives

Generally, a user will choose a transportation mode or service based on the following drivers and barriers.

Users' perspectives	
<p>Drivers</p> <p>Accessibility / Availability / Flexibility</p> <ul style="list-style-type: none"> 24/7 Short walking distance to nearest service <p>Efficiency</p> <ul style="list-style-type: none"> Time saving Driven mainly by free-floating experience <p>Specific purpose / desire</p> <ul style="list-style-type: none"> Carrying goods Belonging to innovative, modern community 	<p>Barriers</p> <p>Affordability (perceived high price)</p> <ul style="list-style-type: none"> Cost per trip Exposure to full mobility cost (non-subsidised) <p>Limited service area/ accessibility</p> <ul style="list-style-type: none"> Focus on urban centres or areas of minimum certain density <p>Safety conditions / traffic conditions / lack of appropriate infrastructure</p> <ul style="list-style-type: none"> Lack of adequate infrastructure Riding on poorly maintained roads Speed differences with car traffic when riding on roads and congestion

Figure 8-2: Summary of the Users' Perspectives

The perspectives described before can be translated in objectives from users’ point of view regarding mobility services, namely:

- Ensure service affordability: affordable transportation fares;
- Ensure a service with the proper safety conditions and traffic conditions, using adequate infrastructure conditions;
- Ensure service accessibility (including to users with disabilities and specific needs, namely gender specific);
- Ensure service efficiency / time saving;
- Ensure service availability /flexibility and reliability.

Operators’ / Private Sector’s Perspectives and Objectives

Operators, or private sector stakeholders, when investing in a transportation business, start by addressing two major aspects: potential users and main costs of the service. Summarized below, are the common main perspectives of the private sector towards mobility services.

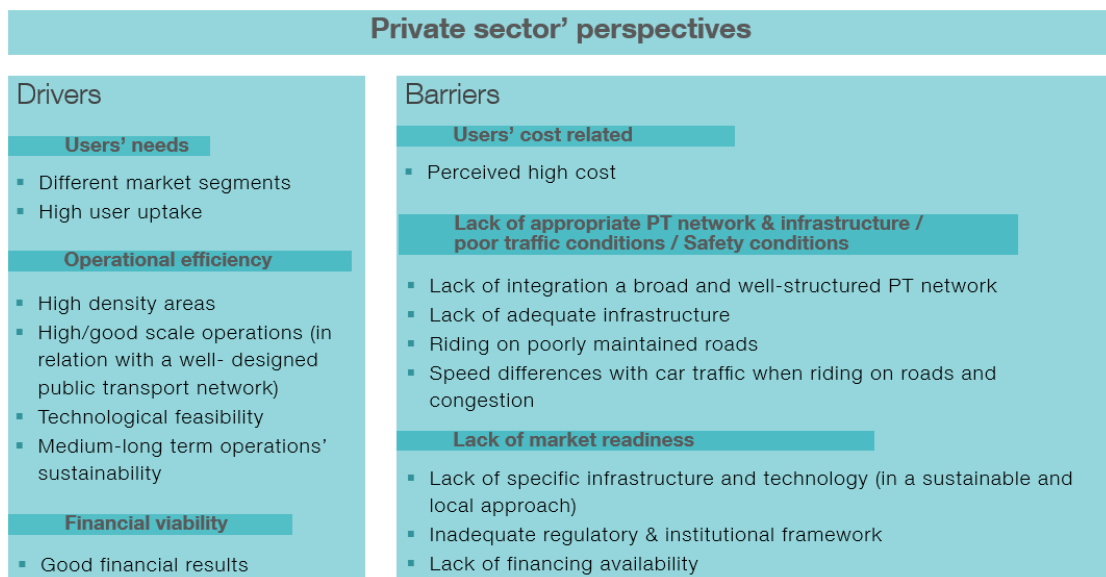


Figure 8-3: Summary of Private Sector Perspectives

These perspectives can be translated into objectives from the private sector/operators’ point of view regarding mobility services, namely:

- High user uptake, profitability, and financial viability (good financial results).
- Operational efficiency by avoiding low density areas.
- Avoid low scale operations.
- Provide best user experience through removing barriers to use and insure integration with public transport network.
- Ensure adequate vehicle efficiency and technological conditions.
- Energy efficiency of vehicles and operations, which derive in a low environmental impact.

Public Sector/Authorities' Objectives

The public sector plays a critical role in urban mobility through the definition of objectives, the establishment of policies and regulatory framework, as well as the insurance of enforcement. In general, public authorities' expectations and aspirations towards mobility services, can be summarized as presented hereafter.



Figure 8-4: Public Sector Main Objectives

The objectives stated in different Ghanaian transport related policies are perfectly in line with the common public sector objectives, as highlighted hereafter.

The National Transport Policy mentions the following strategic objectives:

- Create an accessible, affordable, reliable, safe and secure transport system for all users.
- Establish Ghana as a transport hub within the West African sub-region.
- Provide transport infrastructure and services without compromising the integrity of society, environment, health and the climate.
- Increase private sector investment and improve utilization of public financing.
- Create an integrated and harmonized transport planning framework.
- Develop and adopt a legal mandate and institutional framework for implementation of transport sector policies and plans.
- Enforce standards, regulations, and rules in the transport sector.
- Develop and implement a research and development system to support effective policy formulation, planning and implementation.
- Develop adequately skilled human resources for executing all aspects of the transport sector mandate.
- Apply new and appropriate technology and innovations to transport infrastructure and service delivery.

The National Climate Change Policy refers the following objectives in relation with the transportation sector:

- Increase the share of road-based mass transportation systems, including extending Bus Rapid Transit (BRT) corridors.
- Reduce the amount of fossil fuel consumed, which relies one banning the import of light-duty vehicles more than 10 years and promoting efficient alternative vehicle technologies, including Electric Vehicles (EVs).

With the National Electric Policy and Market Readiness for Ghana, a framework for the deployment of EVs has been set but major barriers still need to be lifted, and sector-specific regulations will need to be implemented.

8.2 Presentation of Scenarios

Scenarios have been developed for a planning horizon of 10 years, based on the main features revealed by the analysis of reference documents, urban mobility trends, estimation of future demand, feedback from surveys on users' satisfaction, and interviews from stakeholders. The main inputs are summarized below:

- **Mobility demand will continue to rise** and there is a need to provide a mix of different mobility services solutions, in order to ensure a more sustainable and energy-efficient choices.
- **The users' survey has confirmed that affordability ranks top on the list of drivers and barriers for new mobility services in Ghana**, with most users stating their unwillingness to pay more.
- **Safety conditions and traffic conditions are a concern among the users, as well as the lack of appropriate infrastructure.**
- **The private sector initiatives and technological knowledge confirms its readiness to continue to scale-up existing services and to introduce new mobility services.**
- The **private sector reveals awareness regarding the need to continue towards sustainable, low-emission and energy efficient operations.**
- **High costs (capital and operating expenditures) and difficulties in obtaining financing** constitute significant obstacles to scaling-up existing services and introducing new mobility services. The operational costs also relate to vehicle maintenance costs, which are very important given the road conditions.
- The public sector plays a critical role in urban mobility through the definition of objectives, the establishment of policies and regulatory framework, as well as the insurance of enforcement. **At the policy, regulatory and institutional level, despite the existing policy documents and a clear indication of strategic objectives, there is a strong difficulty at the implementation level**, due to:
 - the lack of coordination between institutions;
 - in some cases, lack of and adequate regulatory framework (e.g., the absence of a Tax Policy which promotes the acquisition of low-emission vehicles);
 - the lack of actionable plans and ;
 - a clear constraint in terms of budgetary resources.

Three scenarios have been identified and are described hereafter:

- **Scenario 0 - Business as usual (BaU) – “Do Nothing”**
- **Scenario 1 – “Restricted Expansion of Mobility Services”**
- **Scenario 2 – “Take action on sustainable urban mobility and shift to electric mobility”**

Scenario 0 - “Do Nothing”

This scenario is characterized by a “business as usual” approach, with no alterations being made to change the *status quo*, namely:

- Continuous inaction and inability from public authorities to implement urban mobility related policies.
- No evolution of the regulatory framework and absence of improvement of enforcement.
- Worsening of travel conditions for all modes specially for public transport, paratransit modes of transport (trodro, okada) and non-motorized.
- Increase in the share of private vehicles.

- Worsening of congestion and parking issues.
- Very limited mobility services scale-up.

Scenario 1 – “Restricted Expansion of Mobility Services”

This scenario is characterized by a cautious scale-up of existing mobility services and introduction of new services, making use of less costly solutions, aiming at reducing car ownership and increasing shared mobility services, through:

- A timid evolution in the regulatory framework, with a positive impact in vehicles’ purchase cost, at least 2 and 3-wheelers.
- Punctual implementation of sustainable urban mobility measures/projects.
- Introduction of electric 2-wheelers and 3-wheelers and low-emission combustion engine 4-wheelers
- Scale-up of existing mobility services, such as, car-sharing and ride-sharing, with very limited introduction of electric 4-wheelers (almost insignificant).

Scenario 2 – “Substantial Expansion of Mobility Services and shift to electric mobility”

This scenario is characterized by an effective action towards delivering urban mobility and e-mobility agendas’ priorities through actionable plans, partnerships with private sector and international investments, translated in:

- A comprehensive update of the regulatory framework, ensuring a positive impact in the efficiency of the urban mobility system.
- The implementation of sustainable urban mobility measures/projects which allow to put in place the backbone of public transport networks.
- The scale-up of mobility services to electric vehicles, with the introduction of minimums of electric fleets’ share.
- The Introduction of mobility services specifically designed for people with disabilities and other groups with specific needs, like women.

8.3 Evaluation of Scenarios

Based on the objectives and barriers identified, key-criteria have been identified to elaborate a multicriteria evaluation of the scenarios, accompanied by a risk analysis. The risks mainly relate to the potential of ineffectiveness or difficulties of public sector authorities to put in place the required conditions to create the right environment for mobility services to flourish and be scaled-up.

Table 8-1: Multicriteria Evaluation of Scenarios

		Scenario 1 “Restricted Expansion of Mobility Services”	Scenario 2 “Substantial Expansion of Mobility Services and shift to electric mobility”
Users	Affordability for users (direct cost for users, with no subsidy policy)	-	--
	Safety conditions, traffic conditions and appropriate infrastructure	~	+
	Accessibility for all	~	+
Private sector	Adequate policy / regulatory/ institutional framework promoting operational efficiency /	~	+

	viability		
	Availability of financing	~	~+
Public sector	Contribution to sustainability / low environmental impact	~	++
Critical risk factor	Lack of actionable plans and measures to put in place adequate policy, regulatory and institutional framework	-	---
Legend: - negative impact; ~ irrelevant impact; + positive impact			

Scenario 2 - “Substantial expansion of mobility services and shift to electric mobility” is the scenario that better responds to the key objectives. However, it presents the **higher risk as it depends on the ability of the public sector** to create the adequate environment for mobility services to flourish, which is difficult to foresee in place in the next 5 to 10 years.

It is considered that a stepped approach is required, meaning that **for the very short term (1-3 years), short term (3-5 years) and medium term (5-10 years), it is very unlikely that the right regulatory framework is in place and, therefore, scenario 1 measures are more suited.** Nevertheless, it is also important to put in place measures that allow for scenario 2 to be at its early stage, at least in the medium term.

8.4 Proposed Road Map

The following action plan is foreseen, based on the different barriers and opportunities expressed.

An exercise of estimation of a potential demand (annual trips) was conducted based on the estimation of future demand (presented in Figure 6-3) and a Sensitivity Analysis (Appendix 11).

Table 8-2: Proposed Road Map

Horizon	Expected measures	Potential demand estimation interval for Accra (Annual trips) & Estimation hypothesis
1-3 years	<ul style="list-style-type: none"> ■ Timid evolution in the regulatory framework, with at least a positive impact on vehicles' purchase cost, for at least 2 and 3-wheelers. ■ Introduction of electric 2-wheelers and 3-wheelers ■ Development of awareness raising campaigns regarding sustainable mobility solutions. ■ Preparation of the E-mobility Policy actionable plans. 	<p>1,648,800 to 3,299,200 (0,1% PT 2025 to 0,2% PT 2025)</p>
3-5 years	<ul style="list-style-type: none"> ■ Continuation of the timid evolution in the regulatory framework, including the first actions towards e-mobility solutions. ■ Punctual implementation of sustainable urban mobility measures/projects. ■ Scale-up of the introduction of electric 2-wheelers and 3-wheelers 	<p>3,827,200 to 6,822,400 (0,2% PT 2025 to 0,3% PT 2030 + 0,1% PV 2022 to 0,2% PV 2025)</p>

	<ul style="list-style-type: none"> Scale-up of existing mobility services, such as, car-sharing and ride-sharing, with the introduction of low-emission combustion engine 4-wheelers and very limited introduction of electric 4-wheelers. Introduction of mobility services specifically designed for people with disabilities and other groups with specific needs, like women. Implementation of the e-mobility related actions, including charging infrastructures. 	
<p>5-10 years</p>	<ul style="list-style-type: none"> Continuation of the evolution in the regulatory framework, aiming at creating the right environment for an efficient urban mobility system, including for e-mobility. Continuation of the implementation of sustainable urban mobility measures/projects, creating the road safety conditions and aiming at the implementation of mass transit solutions. Continue the scale-up of the introduction of electric 2-wheelers and 3-wheelers. Scale-up of existing mobility services, such as, car-sharing and ride-sharing, with a more significant fleet of electric 4-wheelers. Scale-up the mobility services specifically designed for people with disabilities and other groups with specific needs, like women. Continuation of the implementation of the e-mobility related actions. 	<p>6,822,400 to 10,704,000</p> <p>(0,3% PT 2030 to 0,4% PT 2035 + 0,2% PV 2025 to 0,3% PV 2035)</p>

Regarding the exercise on the potential demand estimation, the hypothesis considered were based on a pessimistic approach, given the evolution seen in the past years. The Sensitivity Analysis presented in Appendix 11 allows the reader to have an idea of the potential if a different approach is considered, displaying the percentages up to 10% modal shifts from public transport trips and private car trips.

8.5 General Recommendations

The recommendations presented in this chapter aim at creating the right environment for the scale-up of existing mobility services or implementation of new services.

The analysis of the context, the users' surveys and the different stakeholders' interviews and discussions with the focus groups from the private and public sector allow to state that the private sector has shown readiness to implement and continue to either scale-up or invest in new and energy-efficient solutions. Nevertheless, the major challenge mobility services, and urban mobility in general, is facing is for the public sector to take action.

The recommendations include, among others, recommendations issued from international reference documents on the Ghanaian context, and the measures listed in the recent policy document regarding the *National Electric Mobility Policy and Market Readiness for Ghana, 2022*.

Recommendations are presented by theme.

Policy, regulatory and institutional

- Ensure an effective coordination between all levels of the public administration playing a role in urban mobility, through the creation or reestablishment of task forces or committees.
- Include in policy, regulatory and institutional framework an **integrated vision on sustainable and equitable urban mobility, which embraces all modes of transportation, including mobility services**, such as shared mobility and micromobility, **and the need to ensure universal accessibility to all people, namely people with disabilities and specific users' needs.**

- **Public authorities should consider all transport modes and mobility services when planning, regulating and funding urban mobility.** Their respective contribution to positive social, economic, and environmental outcomes should be assessed and considered.
- **Implement an action-oriented framework, by preparing and implementing plans and projects towards ensuring sustainable mobility and accessibility to all,** namely through high performance public transport (such as mass transit solutions), which is the backbone of urban mobility systems, and other sustainable modes (non-motorized modes) and mobility services (including e-mobility solutions).
- **To ensure an efficient multimodal, intermodal and equitable transport system, which integrates all mobility modes and services, urban mobility regulation should be defined in accordance, namely:**
 - The **regulatory regime should integrate trotros, taxis and mobility services** (shared mobility, micromobility), **as transport service providers.**
 - The **transport services providers should be consulted at the beginning of the process of defining regulations.** Proactive engagement and collaboration with transport services providers should help reduce the need of future adjustments.
 - **Public authorities should focus on applying outcome-based regulations linked to performance criteria.** For example, for mobility services, these criteria could relate to the number of trips per vehicle per day and targets for making vehicles available in areas with poor transit accessibility.
 - **Regulatory fees should be set in light of the potential value of transport modes/mobility services for sustainable mobility.** A specific attention should be given to the uncertain viability of micromobility services' business models.
 - **Public transport services should be promoted in areas of cities not served/less served and to users with specific needs.** To ensure that it is financially viable for public transport providers to provide such services, **public authorities might consider subsidies to service providers** to achieve desired accessibility and connectivity requirements.
 - **In relation with mobility services, it is important to adopt an adaptive and flexible regulatory approach.** Public authorities should ensure that regulatory interventions allow service providers to adopt new business models and technologies and respond to demand, and do not impede innovation. It would be important to leave room to trialling regulatory approaches.
- Ensure consistent budgetary resources through the stabilization of budget allocations and the definition of a financial mechanism related to urban mobility. This should include a finance mechanism in relation with general fleet renewal through energy-efficient vehicles in relation with all mobility services.
- **Ensure policies and regulations which promote sustainable solutions services, energy-efficient vehicles, fuel quality and emerging technologies,** through the establishment of the correct vehicles' standards and limitations, as well as import conditions:
 - For example, since 2015 the import duty (CET Act of 2015, Act 905), high-capacity buses are not exempt from import duty, which should be altered.
 - Also, instead of supporting vehicles with lower engine displacement, often more efficient, the Act imposes 10% import duty on vehicles with engine capacity of above 1500 to 1900 cc. The Act should support more energy-efficient engines.

Therefore, there is a need to define a clear policy direction with respect to the application of import duties and taxes on electric vehicles (EVs) and other energy-efficient vehicles, including non-motorized and electric 2 and 3 wheelers.

Electric Mobility

- *Review of the Harmonized System (HS) Customs code to facilitate proper estimation of import duties and related issues of registration.*
- *Standardization, licensing and certification of chargers, charging systems and charging installation.*
- *Research and capacity development.*
- *Dealing with power outages, through Geographic Information System and Meter Management System (MMS).*

- *Renewable electricity for charging and battery storage energy system for energy security.*
- *Close collaboration among partnering ministries and agencies to promote transition to green technologies.*
- *Attract funding for promoting EV uptake.*
- *Overages vehicles importation regime to be reviewed.*

The National Electric Mobility Policy and Market Readiness for Ghana (2022) refers that the top priorities for eMobility in Ghana are Buses for public transport and Cars for personal transport. This should not be translated in regulations and financing that do not include other vehicles, such as electric bikes or electric 3-wheelers.

Economic and financial

- Conduct an **analysis of new potential revenue sources to finance urban mobility and accessibility**. It should be analysed both the financing from the users and other direct beneficiaries of urban mobility improvements and the financing from indirect beneficiaries. Some examples are described below:
 - expand existing taxes on vehicle purchase and annual registration. The possibility of earmarking revenue from these taxes could also be explored.
 - review fees on public transport operators for licenses/permits and use of terminals. These fees are collected by assemblies and could therefore easily be directed for urban mobility. Parking should also be regulated and managed at the municipal level, to become a source a revenue (starting with central and commercial areas).
 - Given the current situation in terms of fuel prices, increase taxation on fuel doesn't seem an option. However, part of the proceeds from existing taxes on fuel are paid into the Road Fund, whose mandate could be expanded to include urban mobility.
 - In the medium term, the implementation of betterment taxes in connection with the development of transport infrastructure should also be explored, as existing legislation makes provision for assemblies to collect such tax.
- **Promote a local/national economy in relation with urban mobility, including e-mobility**, following the measures proposed in the National Electric Mobility Policy and Market Readiness for Ghana (2022), including all types of electric vehicles (bikes and 3 wheelers).

Electric Mobility

- *Tax waivers and tax holidays for electric vehicles, batteries and charging units*
- *Special electricity (energy) tariff for EV vehicles*
- *Measures for development of local industry*
 - *Adapting the Ghana Automotive Development Policy to operationalize and promote the development of a local industry for EVs*
 - *Assembling plant establishment*

Infrastructure and Technical

- **Implement an efficient multimodal and intermodal transport system, which integrates all mobility modes and services and gives priority to the most sustainable modes and solutions**, including developing mass transit systems in cities like Accra and Kumasi. This would contribute to start addressing the important congestion problems in Ghana.
- **Develop and implement traffic and parking management plans/solutions** which allow to improve traffic conditions for public transport and more sustainable modes and services.
- Ensure **correct dimensioning and design of road space and public space in general, by reallocating road space to sustainable modes and put in place parking management measures**, which would create

safety conditions for all users, in particular the most vulnerable ones. This should include measure like pedestrian and cycling infrastructures, dedicated bus lanes and parking places exclusively intended for specific users/usage.

- **Set up a public-oriented digital portal centralizing transportation information**, regarding all available transportation solutions, including mobility services. This could allow productivity gains and better customer satisfaction.
- **Ensure adequate standards energy-efficient vehicles, fuel quality and emerging technologies.**

Electric Mobility

- *Installation of private (home) charging systems.*
- *Installation of multiple public charging points.*
- *Installation of inter-city charging points.*
- *Fast chargers, connectors and charging systems.*
- *Backup power systems.*
- *Battery swapping, recycling and end-of-life disposal systems.*
- *Increase in the range of EVs.*
- *Continuous training and skill development of local auto-mechanics, electricians, garage operators.*
- *Development of local skill in low carbon technology.*
- *Retrofitting ICEVs to EVs, to bring down the final cost to the end-user.*

Social/Users

- **Current transportation costs are considered too high for the users, including from public transport users, and users are unwilling to pay more**, as they are facing important challenges regarding the current inflation rate and economic conditions. Subsidizing public transport and sustainable transportation modes and services for low-income population should be analysed by public authorities.
- **Increase the engagement of public transport providers in conversations with public authorities on urban mobility and possible mobility services.** A constructive dialogue with interest groups, including international vehicles' manufacturers and donors should be encouraged.

Electric Mobility

- *Procuring, piloting and testing of EVs to demonstrate their quality, safety, performance and reliability with the country.*
- *Adding EVs to government vehicle fleet.*
- *Roadmap of EV awareness creation and campaigns.*

8.6 Pilot Project

The current study aimed at identifying a pilot project, which would serve as a catalyst for scaling-up mobility services in Ghana.

The Greater Accra Passenger Transport Executive (GAPTE) is the entity now in charge of the operation of the Aayalolo buses, whose expected role was to act as Transport Authority for the Greater Accra Metropolitan Area. GAPTE aims at implementing an Integrated Mobility Platform in the future. Such a platform would incorporate different components, such as, information on all available mobility services, a registration/licencing component; a traffic management centre and an electronic payment component. This project is still at its infant stage.

The pilot project intends to assist GAPTE in the preliminary understanding regarding the possible functional and institutional architecture of such a platform. The project is expected to focus on leveraging the existing Trotro App, aiming at the integration of the information regarding Ayalolo buses .

APPENDICES

Appendix 1 – Ghana’s Motorization Trends

Table A-1: Motorization Rates at the National and Main City- Level for Selected African Countries

	Motorization (veh/ 1'000 inhabitants)	
	National	Main city
Senegal	n/a	40
Ivory Coast	n/a	21
Guinea	n/a	36
Ghana	70	240
Nigeria	60	250 (Abuja)
Kenya	26 à 28	96
Ethiopia	6	130
Rwanda	15	40

Source: Transnational report, SSATP, 2021

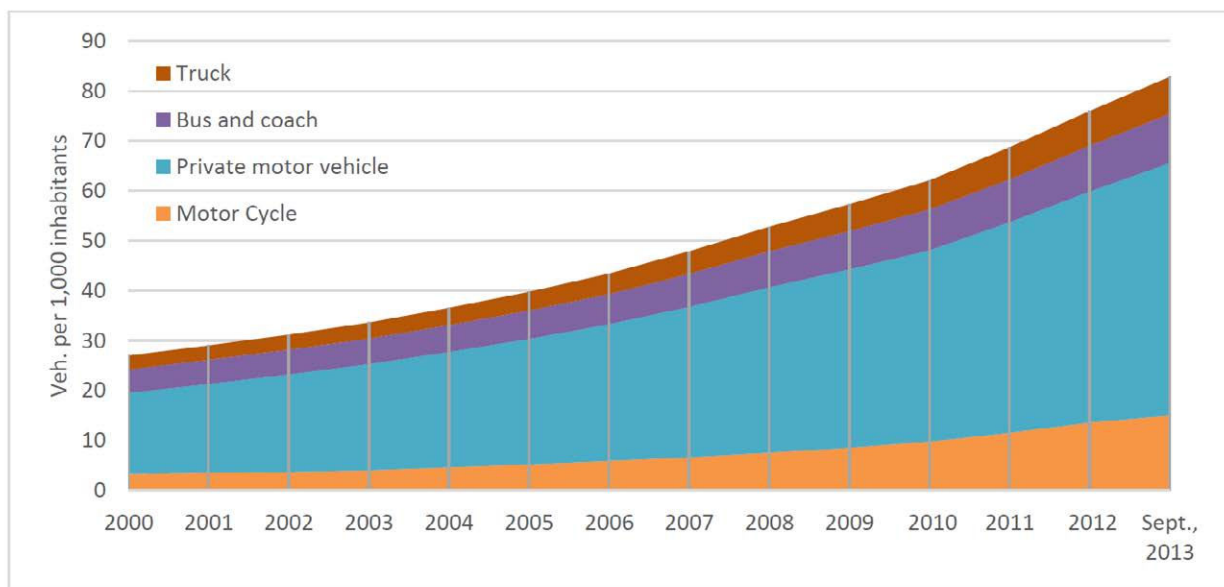


Figure A-1: Ghana's Motorization Trend from 2000 - 2013⁸

⁸ Source: The Driver and Vehicle Licensing Authority (DVLA), Ministry of Transport; Page 23: Africa Transport Policy Program (SSATP) – Policies for Sustainable Accessibility and Mobility in Urban Areas of Ghana

Appendix 2 – Vehicle Import Regulations

Table A-2: Import Duties and Taxes Per Type of Vehicles

Type of vehicle	Import Duty (%)	VAT (%)	NHIL (%)	ECOWAS Levy (%)	EDIF (%)	EXAM (%)
Motor cars						
Cylinder capacity < 1900 cc	5	12,5	2,5	0,5	0,5	1
Cylinder capacity < 3000 cc	10	12,5	2,5	0,5	0,5	1
Cylinder capacity > 3000 cc	20	12,5	2,5	0,5	0,5	1
Motor vehicles						
Capacity > 10 persons	5	12,5	2,5	0,5	0,5	1
Capacity > 30 persons	0	12,5	2,5	0,5	0,5	1
Good vehicles	5	12,5	2,5	0,5	0,5	1

Source: Ghana Revenue Authority (GRA), Customs.

For **used vehicles**, the price of the vehicles to be considered in the calculation of tax duty depends on the age of the vehicle:

- < 6 months - The price shall be deemed to be the first Purchase Price
- Between 6 months and 1,5 years - 85% of the first Purchase Price
- Between 1,5 and 2,5 years - 70% of the first Purchase Price
- Between 2,5 years and 5 years - 60% of the first Purchase Price
- > 5 years - 50% of purchase price

Since 1993, for some categories of vehicles older than 10 years, **penalties** are imposed in addition to any applicable duties and taxes. Since the 2000 Customs Amendment Act, vehicles older than 10 years have been completely banned. However, regulations have not yet been defined, and the following penalties are still prevailing:

Table A-3: Penalties for Aged Vehicles

Age	Penalties		
	Motor cars	Commercial vehicles such as buses, coaches and vans	Commercial vehicles such as trucks, lorries and tipper trucks
10 to 12 years	5% of CIF value	2,5% of CIF value	5% of CIF value
12 to 15 years	20% of CIF value	10% of CIF value	10% of CIF value
> 15 years	50% of CIF value	15% of CIF value	
> 20 years		50% of CIF value	
> 22 years			30% of CIF value

CIF: Cost, insurance and freight

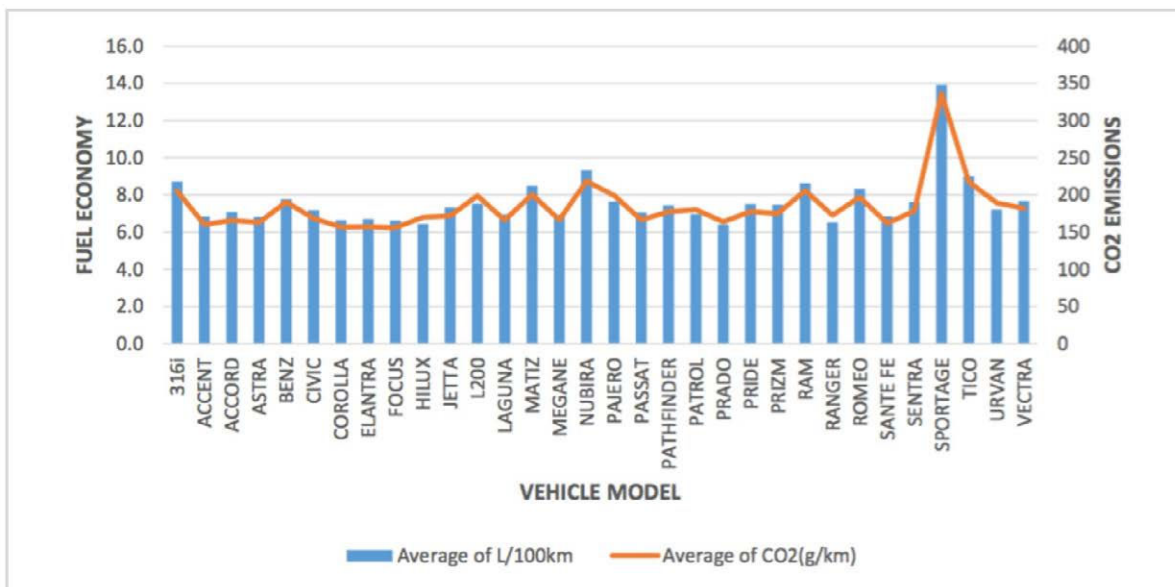
Source: GRA, Customs division.

Appendix 3 – Average Fuel Efficiency and Average Fuel Economy in Ghana

Table A-4: Average Fuel efficiency and CO₂ Emissions of LDVs in Ghana

Year	Average age LDV's (years)	Average fuel economy (L/100km)	Average CO ₂ emissions (g/km)
2005	5.7	7.4	180
2011	4.1	7.3	178
2016	5	6,9	162

Source: GFEI (2018)



Source: GFEI (2018)

Figure A-2: Average Fuel Economy (L/100km) and CO₂ Emissions by Popular Models

Appendix 4 – Permitting and License Costs

Table A-5: Permitting and Licensing Costs for Transport Operators

Type of charge	Competent authority	Cost in GHC (per year)
Driving licence	DVLA	75
Commercial licence	DVLA	20
Roadworthy certificate	DVLA	96
Driver's permit	MMDA	20 to 50
Assembly licence	MMDA	20 to 70
Assembly sticker	MMDA	15 to 50

Appendix 5 – Daily Net Income of Transport Work Force

Table A-6: Transport Workforce - Daily Net Income

	Trotro drivers	Trotro mates	Taxi drivers	Okada drivers	Onboard transport workers (average)	Ghana minimum wage (2022) ⁹
Net daily income – GHC (EUR)	58.91 GHC (7,15 EUR)	35.50 GHC (4,31 EUR)	48.97 GHC (5,94 EUR)	39.44 GHC (4,79 EUR)	45.71 GHC (5,55 EUR)	13.53 GHC (1,52 EUR)

Source: Study of public transport operations and performance and transition to scheduled services in GAMA, Transitec - Ghana Urban Mobility and Accessibility Project (GUMAP), 2021-2022

⁹ National Tripartite Committee (NTC)

Appendix 6 – Methodology and Questionnaire of the Commuter Opinion Survey

METHODOLOGY OF THE COMMUTER OPINION SURVEY

Opinion Survey Strategy

The opinion survey will be conducted for a period of five days with four field researchers at different locations and a target of 500 respondents. The survey strategy is to interview different transport users at different locations and demographics to ensure an inclusive and non-biased survey.

Fifteen (15) persons, corresponding to 3% of the sample of 500 respondents, were persons with disability. 56% of respondents were females and 44% were males.

Survey Location and Correspondents

The locations for each survey are selected prioritizing areas with high foot traffic, terminals, car parks, malls, schools, banks and the target respondent.

Target Location	Target Respondent
Kinbu Cooperative Terminal	Trotro users
Aayalolo Terminal	Trotro users
Ministries Car Parks	Trotro users, Ride hailing app users, Private car users, Okada users
Impact hub	Ride hailing app users, Private car users, Students
Marina mall, Accra mall	Trotro users, Ride hailing app users, Private car users, Okada users
Standard Chartered Bank Head Office	Private car users, Ride hailing app users
Mariott Hotel	Persons with disabilities
University of Ghana Legon, Accra Polytechnic	Students
Ministry of Defense	Persons with disabilities

Survey Questions

The opinion survey questions enquire demography, current mobility, knowledge of ride-sharing, willingness to change the form of mobility to a sustainable one, willingness to pay etc.

Tools

Kobotoolbox is a free and open-source tool used for data collection. It has functionalities like collecting GPS coordinates of the survey area, rating of questions, easy question flow etc.

Questions after formulation are transferred to GPS enabled phones to conduct the survey.

The questionnaire can be viewed from the [Kobotoolbox](#) link.

Socio-economic questions

1. Name of the participant
2. Survey location (name of the terminal, parking lot etc.)
3. Gender
4. Age group
 - a. Under 21
 - b. 21-30
 - c. 31-45
 - d. 46+
5. Occupation
 - a. Student
 - b. Unemployed
 - c. Employed
 - d. Retired
6. Which income group do you belong to?
 - a. Below 1000 GHC/month
 - b. 1000 to 2000 GHC/month
 - c. Above 2000 GHC/month
7. How much do you spend on Transport on a daily basis?
 - a. On a daily basis (for public transport / trotro / Okada / taxis users)
 - i. Less than 10 GHC
 - ii. Between 10 and 20 GHC
 - iii. Above 20 GHC
 - b. On a monthly basis (for private car users)
 - i. Less than 500 GHC/month
 - ii. Between 500 and 1000 GHC/month
 - iii. Above 1000 GHC / month

Trip

1. What mode of transport are you using for the ongoing trip?

May be filled directly by the surveyor if obvious

- a. Collective mode of Public transport
 - i. Trotro
 - ii. Ayalolo
 - iii. MetroMass
 - b. Individual mode of Public Transport
 - i. Okada
 - ii. Shared taxi
 - iii. Private taxi
 - iv. Ride-hailing taxi
 - c. Private transport
 - i. Private car
 - ii. Motorbike
 - iii. Bicycle
 - d. Walking
2. [FOR PUBLIC TRANSPORT USERS] How did you reach the station/terminal?

To be displayed only if the person has answered a. or b. in the previous question.

- a. Walking
 - i. If yes, how long did you walk ? (in minutes)

We would then convert it into m/km at the time of data processing.

- b. Cycling
 - c. Another bus/trotro/Okada
3. Why are you travelling today?
- a. Work
 - b. School

- c. Social visit (family, church, etc.)
 - d. Administrative visit (medical, government office, etc.)
4. How often do you use this mode of transport?
- a. Several times a week
 - b. A few times per month
 - c. Very rarely/first time
5. What is the duration of your trip?
- a. 0-30 min
 - b. 30-60 min
 - c. An hour and above
6. What is your origin and destination?

→ Drop-down menu with various locations (MMDAs?). Such zoning may facilitate data processing. However, users may not be aware of MMDAs delimitation. Is there a "location" field in Kobotoolbox which can allocate a particular location or landmark to a zone ?

Satisfaction

7. How do you rate your current mode of transportation ? (one start = very unhappy; five starts = very happy)
- a. Waiting time
 - b. Comfort
 - c. Trip duration
 - d. Accessibility
 - e. Safety & security
 - f. Cost
8. What aspect of your mode of transport should be improved in priority according to you ?

→ Free text entry

9. Do you think that the following mobility services could improve your mobility?

Surveyors will need to be briefed on each type of mobility service. Multiple choices are possible.

- a. Car-sharing
 - i. Fleet owned by your employer
 - ii. Fleet owned by a private company, the local authority or private individuals
- b. Ride-sharing
 - i. Run by your employer
 - ii. Run by a private company or private operators, with their own fleet
 - iii. Run by a private company, with vehicles owned by individuals (carpooling)
- c. On-demand services

→ In areas where public transport is not available, or for commuters with reduced mobility or special needs.

- d. Leasing, rental or sharing of Light-duty vehicles

10. If not, why?

- a. Safety
- b. Intimacy/privacy
- c. Convenience/comfort
- d. Other : *Open question - free text*

11. Would you be ready to pay more to access these services?

- a. Yes
- b. No

12. Would you like to add anything?

[OPEN FIELD]

Appendix 7 – Key Results of Commuter Opinion Survey

Table A-7: Table Showing Targeted Respondents at Targeted Locations

Target Location	Target Respondent
Kinbu Cooperative Terminal	Trotro users
Ayalolo Terminal	Trotro users
Ministries Car Parks	Trotro users, Ride hailing app users, Private car users, Okada users
Impact hub	Ride hailing app users, Private car users, Students
Marina mall, Accra mall	Trotro users, Ride hailing app users, Private car users, Okada users
Standard Chartered Bank Head Office	Private car users, Ride hailing app users
Mariott Hotel	Persons with disabilities
University of Ghana Legon, Accra Polytechnic	Students
Ministry of Defense	Persons with disabilities

Presented hereafter, is a summary of the main findings from the survey.

Demographic Information of Current Users

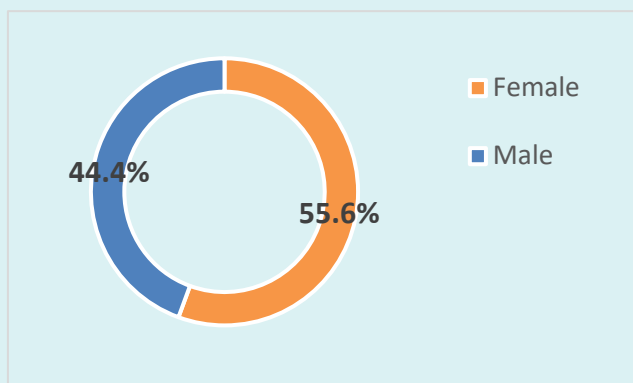


Figure A-3: Gender Distribution

- In terms of income, **46% of respondents reported earning less than GHC 1000/month (~USD 60 10), with 18% reporting a monthly income above GHS 2000 (~USD 125).**

- From the 500 respondents that were surveyed, **56% were females and 44% males**

- As seen from the distribution of respondents by age group, the largest representation of 43% corresponds to respondents who are between 21 – 30 years.

- **Nearly 92% of respondents are 45 years or younger.** 3% of respondents affirmed that they had some form of disability.

- **More than half of respondents (64%) surveyed were found to be employed.** The remainder of respondents were found to either be a student (30%), unemployed (~5%) or retired (2%).

¹⁰ The conversion rate used for the dollar is as of November 29, 2022 and quoted dollar amounts may change due to the current high inflation situation in Ghana.

Trip Characteristics

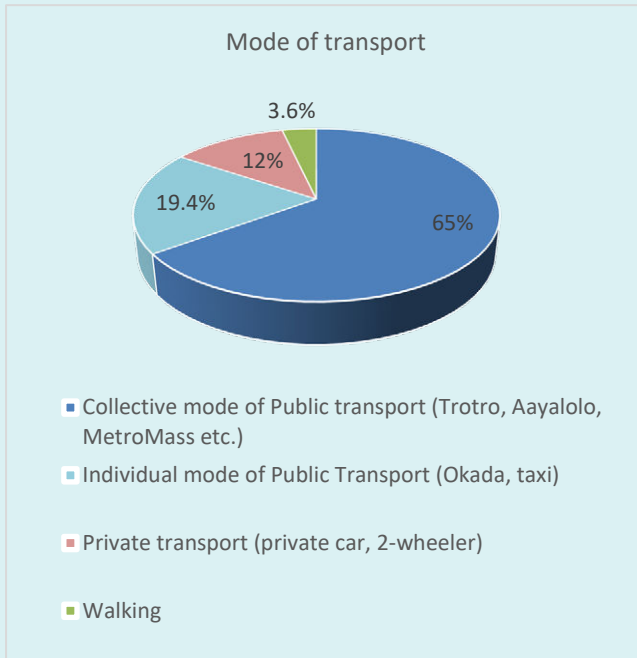


Figure A-4: Mode of Transport Used by Respondents

■ **Modes of transportation:** almost **85%** were undertaking their surveyed trips by public transport, **12%** by private cars and about **4%** by walking.

■ **Of the 324 respondents (representing 65%)** who stated collective modes as their means of public transport, **94%** made their trips with trotros.

■ **Of the 97 respondents who stated individual modes of transport as their means of commute (19,4%), 66%** reported using shared taxis with a marginal 1% reporting the use of ride-hailing services.

■ **Sixty (60) respondents reported private transport as their means of commute (12%). Out of this, 98% were private car users.**

■ **Modal share:** 32% of respondents surveyed made a trip on account of work, 25% for social visits (family, church, etc), 20% for administrative visits (medical, government, office, etc) and 22% for school.

■ **45% of respondents reported spending between 30 minutes to 1 hour on their commute.**

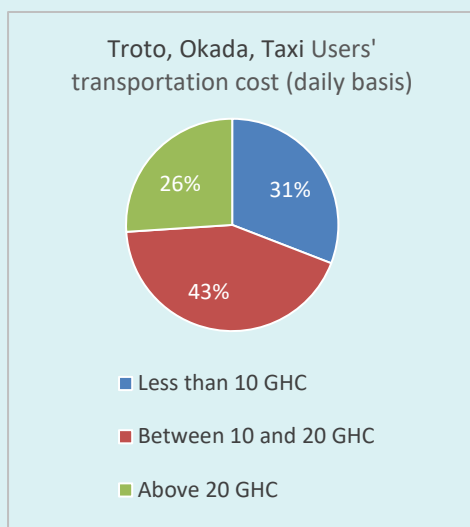
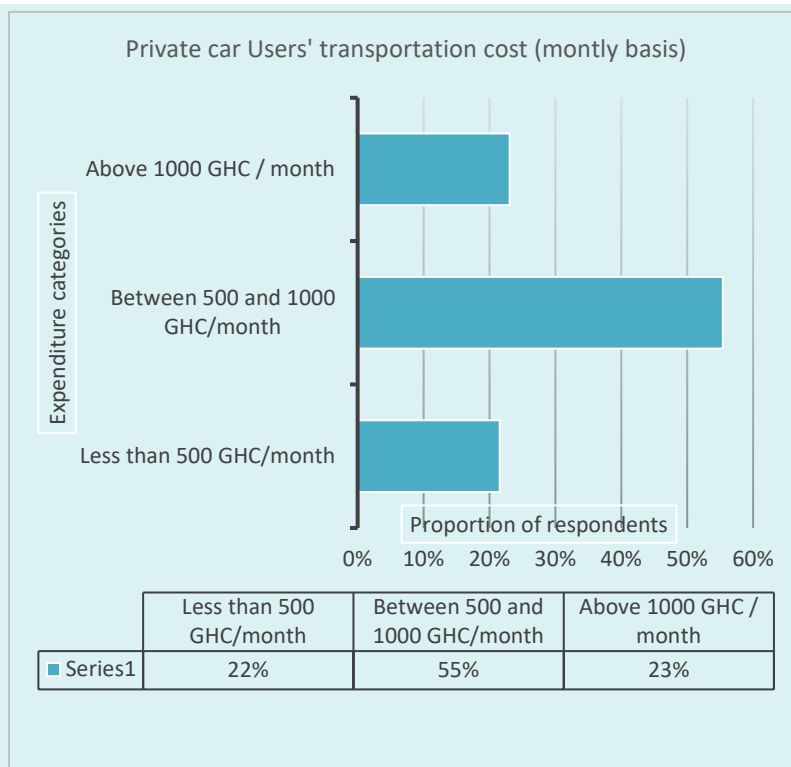


Figure A-5: Daily Budget Spent on Transport by Trotro, Okada and Taxi Users

■ When asked about their daily expenditure on their **usage of collective modes, i.e., trotros, okadas and taxis, 69%** of respondents reported they spent more than **GHC 10 (i.e., ~ 1 USD)**, with **43%** reporting a spend of between **GHC 10 and 20 (i.e., ~ 1 -2 USD)**.

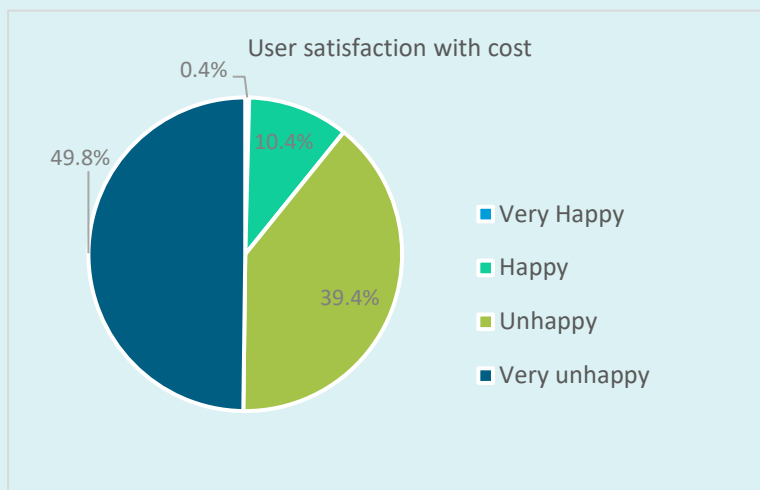


■ **Monthly cost (fuel) of private cars' users: 78% reported spending at least GHC 500 (~USD 50) on transportation, with 55% spending between GHC 500 and GHC 1000 per month.**

Figure A-6: Daily Budget Spent on Transport by Troto, Okada and Taxi Users

In relation with Users' Satisfaction

Users' satisfaction on the mode of transport used for their surveyed trip was assessed. The administered questionnaire posed questions on their level of satisfaction based on cost, accessibility, comfort, waiting time, safety and security. Ratings were on a scale of 1 – 5, with 1 being very unhappy and 5 being very happy.



■ **From the survey conducted, affordability ranks top on the list of drivers for new mobility services in Ghana. Nearly 90% of respondents were either unhappy or very unhappy with their transport costs.**

Figure A-7: User Satisfaction with Cost

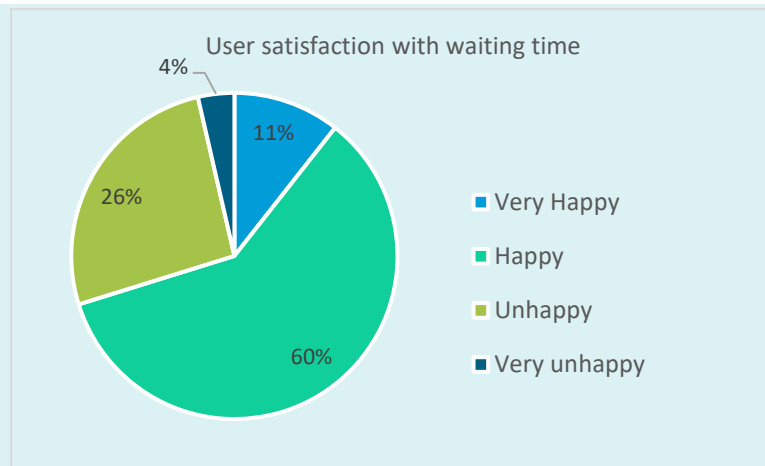


Figure A-8: User Satisfaction with Waiting Time

■ Around **70%** of respondents indicated that they were either happy or very happy with wait times associated with their respective means of transport.

■ Juxtaposed to the feedback received on satisfaction with costs, it could be considered that respondents are more tolerable of wait times, as against transport costs.

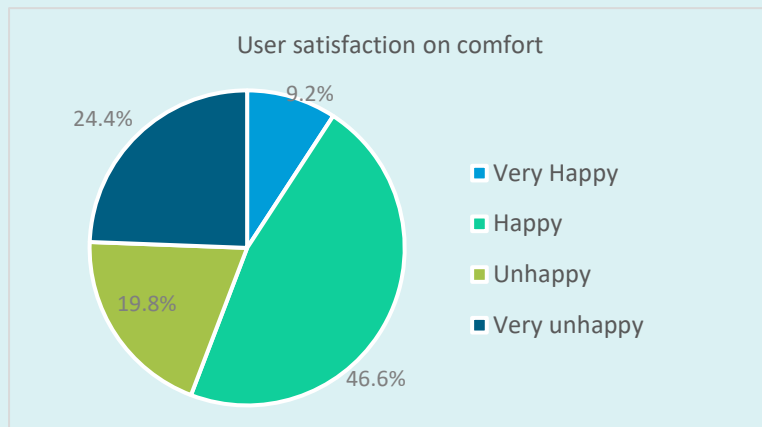


Figure A-9: User Satisfaction with Comfort

■ About **44%** of respondents were either unhappy or very unhappy with comfort for their respective mode of transport. (The point is made that 85% of respondents were users of public transport.)

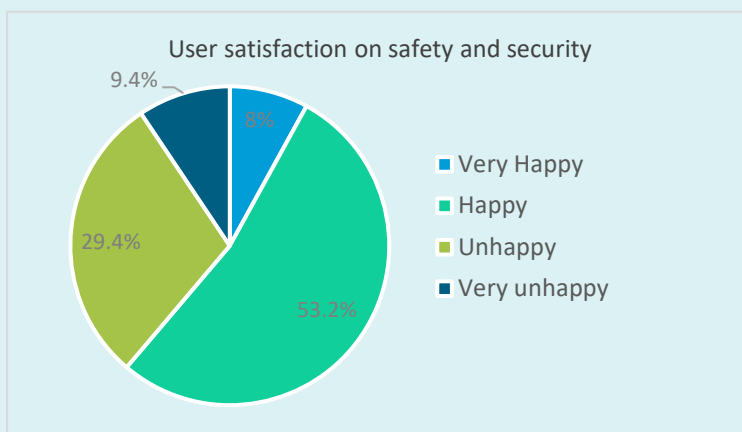
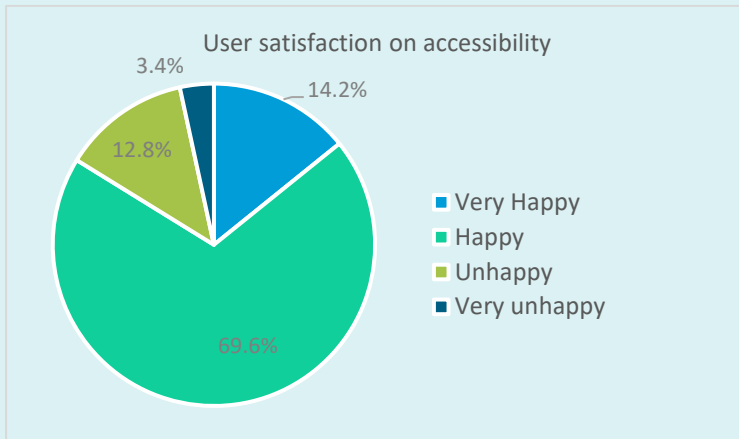


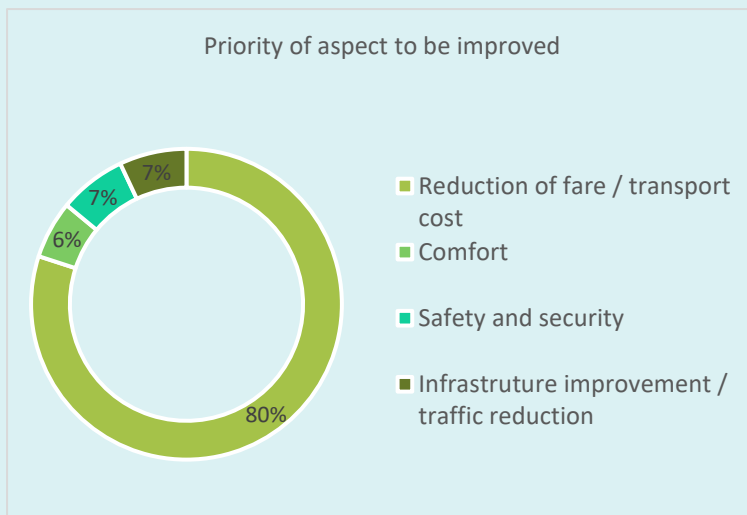
Figure A-10: User Satisfaction with Comfort

■ About **61%** of respondents indicated that they were either happy or very happy with safety and security of their selected mode of transport



■ About **16% of respondents indicated being either unhappy or very unhappy with accessibility related to their mode of transport.**

Figure A-11: User Satisfaction with Accessibility



■ **80% of respondents expressed that there should be a reduction of fare/transport cost.**

■ **20% of the users referred other improvements needed, such as, infrastructure improvement / traffic reduction, safety and security and comfort.**

Figure A-12: Priority of Aspect to Be Improved

Out of 500, 477 respondents (representing about 95%) thought they could experience improvements to their current mobility, with these new mobility services. Of this proportion, the distribution of preferred choice for these mobility services is seen in the figure below:

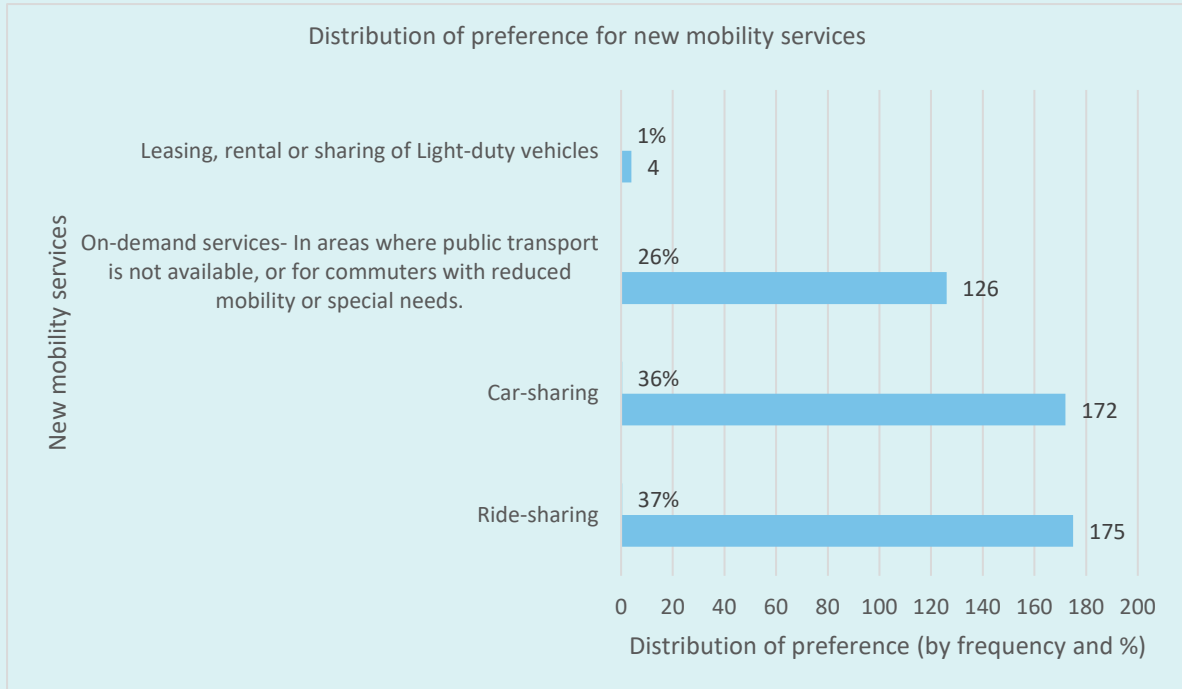


Figure A-13: Distribution of Preference for New Mobility Services

Based on the distribution above, respondents have a greater preference for ride-sharing and car-sharing options. The least selected option was leasing, rental or sharing of light-duty vehicles.

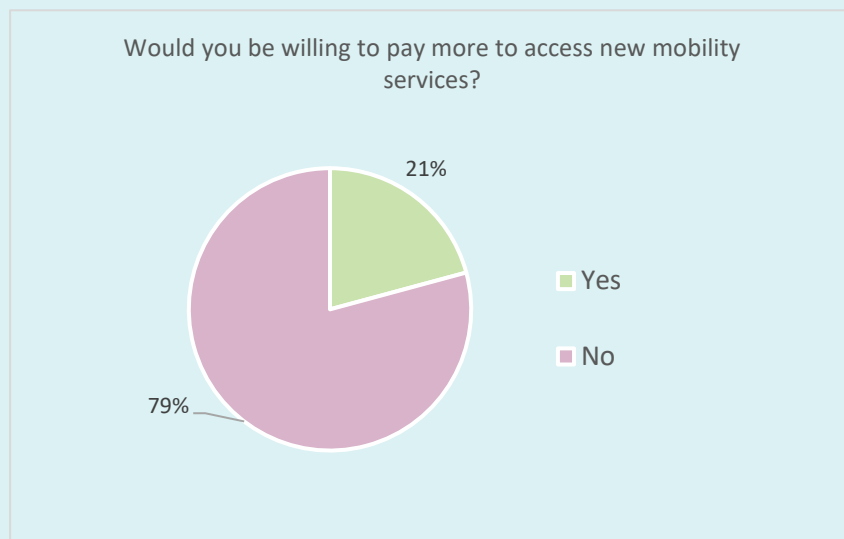


Figure A-14: Distribution of Preference for New Mobility Services

Around 80% of respondents would be unwilling to pay more for new mobility services.

Appendix 8 – Methodology and Questionnaire of the Semi-Structured Interviews

METHODOLOGY OF THE SEMI-STRUCTURED INTERVIEWS

Stakeholder interviews will be conducted with both private and public stakeholders in the transport system in a semi-structured way, wherein the interviewer asks both closed- and open-ended questions.

General recommendations for the interviewers:

- Prompts are proposed as follow-up questions. However, whenever possible, do not hesitate to rephrase by using the participant's words ("you mentioned X, describe an example of how that works").
- If people have already answered a question, you might not have to ask the follow-up questions you have on your interview guide.
- Do not hesitate to write word-for-word some of the key quotes.

Public Officials

Introduction

Thank you for agreeing to participate in the interview. We are interviewing you to better understand mobility conditions and assess the need and potential to develop new mobility services in Ghana.

The interview will take approximately one hour depending on how much information you would like to share. With your permission, I would like to audio record the interview because I don't want to miss any of your comments. All responses will be kept confidential. This means that your interview responses will only be shared with research team members and we will ensure that any information we include in our report does not identify you as the respondent. You may decline to answer any question or stop the interview at any time and for any reason. May I turn on the digital recorder? Are there any questions about what I have just explained?

Establishing rapport

It would be nice if you could tell me a little bit about yourself.

- Where are you from?
- How long have you been working with public transport?
- Can you tell me more about your activity/business/company?

Theme 1 - Policy and governance towards current mobility

-
- What is the state of mobility in your point of view?
 - Prompts: What are the key policies, governance and regulations in mobility services?
 - Prompts: Is the government policies improving mobility or creating an enabling environment for innovation?
 - Prompts: What improvement do you see as necessary in the policy and regulatory framework?
 - Has there been an improvement in mobility?
 - Prompts: Which areas have seen improvement?
 - Prompts: Which areas of mobility need more improvement?
 - Prompts: What is the measurable impact of greenhouse gas emissions on air pollution, health?
 - Prompts: How are policies formulated to mitigate the above negative impacts?
 - Prompts: What is done currently to cater to the needs of women and people living with disabilities?
 - What are the barriers (financial, regulatory, institutional, technical, infrastructural) to the development of sustainable and new mobility services in Ghana?
 - Financial?
 - Regulatory?
 - Institutional?
 - Technical?
 - Infrastructural?

Theme 2 - Market potential, clients, and user groups for new mobility services

- There are other forms of mobility services like ride-sharing, electric vehicles and other innovations that can reduce traffic and carbon emissions. What is your assessment of its market potential?
 - Prompts: Are its potential users ready to try this new form of mobility?
 - Prompts: What are some enabling environments that government and other stakeholders could use to incentivize the use of new forms of mobility?
 - Prompts: In the next 3-5 will there be a demand ?
- Are there other challenges associated with transport and mobility you would like to mention?
- How do you view the role of donor agencies in supporting improved transport systems in your city and where should they priorities their actions?

Thank you very much for your time and the information you shared today!

Additional information to be collected from the interviewee

To be collected orally by the interviewer in the course of the interview or at the end (whenever relevant).

Demographic information

A cover sheet shall be handed over to the interviewee after the interview has been conducted. These questions do not typically generate conversation and shall be filled directly by the interviewee.

Interviewee information	
Name:	
Sex:	
Age group:	
Occupation:	
Years of experience:	
Qualifications:	

Interviewer's observations and opinions

This section is meant for the interviewer to write useful comments or personal opinion on the interview (ex: explain why the person refused to answer a question / justify an answer provided/specify the context of the interview).

Private sector stakeholders

Terms in brackets shall be replaced by the actual term relevant to the city/interviewee.

Introduction

Thank you for agreeing to participate in the interview. We are interviewing you to better assess the mobility services sector.

The interview will take approximately one hour depending on how much information you would like to share. With your permission, I would like to audio record the interview because I don't want to miss any of your comments. All responses will be kept confidential. This means that your interview responses will only be shared with research team members and we will ensure that any information we include in our report does not identify you as the respondent. You may decline to answer any question or stop the interview at any time and for any reason. May I turn on the digital recorder? Are there any questions about what I have just explained?

Establishing rapport

It would be nice if you could tell me a little bit about yourself.

- Where are you from?
- How long have you been working in the industry?
- What service are you involved in?

Theme 1 - Policy and governance towards current mobility

- How do you perceive the government's attitude towards mobility?
 - Prompts: What effect does the government's directives/rules towards mobility have on your work?
 - Prompts: Which policies can support the mobility and transport system? For example, through supporting vehicle imports, reducing tariffs, Permits and an efficient vehicle registration process.
 - Prompts: What are the barriers (financial, regulatory, institutional, technical, infrastructural) to the development of sustainable and new mobility services in Ghana?
- How do you view the current mobility system?
 - Prompts: How do you find the operation of the current mobility? eg taxis, trotros, uber, bolt and delivery services
 - Prompts: What is the cost associated with operating in this {transport system}?
 - Prompts: How are the needs of people with disabilities and women's needs met? If not, what kind of services could be developed?
 - Prompts: What are the challenges associated with operating {transport system}
 - Prompts: Which target market does the {transport system} serve?

Theme 2 – Socioeconomics and organization of the sector

- What is the daily net income of drivers (after paying for fuel, commission, daily maintenance etc.) as well as executives ?
- Are you a member of a union or an association ?
 - If yes, what benefits do you get from it ?
 - If not, why ?
- How are fares determined?
 - What is the basic fare?
 - [For ride-hailing and delivery apps] How are discounts calculated and paid for ?
 - How do you explain that certain platforms (bolt food for instance) are able to offer rates as low as 4 GHC?
- What are your operational expenses? What is the major one ?

Theme 3 - Market potential, clients, and user groups for new mobility services

“New mobility services” should be defined to the interviewee (with concrete examples : ride-sharing, car-sharing, shuttle service etc.).

- In your view, what is the market potential of new mobility services?
 - Prompts: Is there a market interest to adopt new mobility services and pay for it? change the current mobility to a sustainable one?
 - Prompts: In your area of work, would these services be profitable?
 - Prompts: Does your business use sustainable mobility infrastructure and technologies? If yes, how is its performance to traditional forms of mobility?
 - Prompts: What do you perceive are the competition in the market of electric vehicles, ride-sharing etc.
- From your perspective, how could the overall [mobility] service be improved?
 - Prompts: How can changes in governance, policies, fuel quality and policies improve [mobility]/ your business
- How could the mobility service be improved for the [user group]?
 - Prompts: How can technology create seamless engagement?
 - Prompts: Which infrastructure development is required in your point of view for an improvement in [mobility]?
 - Prompts: Do you see an opportunity to improve access to mobility for women and people living with disabilities? What role can they play?
- Are there other challenges or types of support or changes you would like to mention?

- If a development partner was willing to support a pilot project to improve current or future mobility services in Ghana, what would be ideal project (infrastructure, IT equipment/platform, technical assistance, training etc.) and/or location to do so?

Thank you very much for your time and the information you shared today!

Additional information to be collected from the interviewee

To be collected orally by the interviewer in the course of the interview or at the end (whenever relevant).

Age and type of vehicles	
Origin of imported vehicles	
Origin of spare parts	
Gross and net income	
Major expenses	

Demographic information

A cover sheet shall be handed over to the interviewee after the interview has been conducted. These questions do not typically generate conversation and shall be filled directly by the interviewee. This also avoids making spelling mistakes.

Interviewee information	
Name:	
Sex:	
Age:	
Occupation:	
Years of experience:	

Qualifications:	
Working hours:	

Interviewer's observations and opinions

This section is meant for the interviewer to write useful comments or personal opinion on the interview (ex: explain why the person refused to answer a question / justify an answer provided).

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Appendix 9 – Take-Aways from Semi-structured Interviews

Stakeholders from the Ride-hailing (Private) Sector

Table A-8: Ride-Hailing Perspective – SWOT Analysis of Policy and Governance Towards Current Mobility

Strengths/Opportunities	Weaknesses/Threats
<ul style="list-style-type: none"> ■ The government is making efforts in the e-mobility space and has recognized the opportunity ride-hailing services provide. ■ The government is setting up guidelines in the ride-hailing sector. 	<ul style="list-style-type: none"> ■ The government has not made many infrastructure investments in the mobility system to make it affordable for the ordinary user. ■ An attributing factor is poor regulation, policies, and fuel management, causing accessibility challenges to mobility. ■ There is an institutional barrier to adopting new technologies as well as barriers towards regulations towards the advancement of emerging technologies ■ The needs of people with disability are not met with current mobility services. ■ There is no support for entrepreneurs who provide carbon emission-free and sustainable forms of mobility. ■ Seeking insurance services for scooters is a significant issue because the government does not acknowledge them as a form of public mobility. ■ Policies to ensure the provision of infrastructure such as bike lanes and charging for electric bicycles within the city can improve the safety of bike users and the adoption of e-mobility services.

Table A-9: Ride-Hailing Perspective – SWOT Analysis of Socioeconomics and Organization of the Sector

Strengths/Opportunities	Weaknesses/Threats
<ul style="list-style-type: none"> ■ Various forms of discounts are provided to passengers and paid in other forms to the driver ■ Fares are determined by distance travelled as well as total trip time, making the costing system fair to all. 	<ul style="list-style-type: none"> ■ Due to increased fuel prices, drivers engaged in ride-hailing services like Uber or Bolt do not make enough money. ■ There are no associations and unions tailored to ridesharing-hailing or carpooling services. Uber has a global position not to join local unions. ■ App maintenance, payroll, driver and rider support, as well as fuel are the highest operational cost for companies.

Table A-10: Ride-Hailing Perspective – SWOT Analysis of Market Potential, Clients, and User Groups for New Mobility Services

Strengths/Opportunities	Weaknesses/Threats
<ul style="list-style-type: none"> ■ Social enterprises like Black Ride and Lyft & Pay are interested in making mobility affordable to all. They are therefore less interested in making profit, and more interested in better living conditions for drivers and as well as lower vehicle emissions. 	<ul style="list-style-type: none"> ■ Drivers' operational expenses are mostly fuel costs. This cost increases exponentially, reducing their profit margin.

- | | |
|---|---|
| <ul style="list-style-type: none"> ■ There is a recognition of competition in the system. All companies see this competition as healthy to evoke innovation and create better mobility services. ■ The new mobility services are highly profitable as most companies scale and will be more profitable with good infrastructure development. ■ Technology is the primary tool currently used to engage and acquire customers. The main tools are social media platforms and mobile apps. ■ There is an interest in using electric vehicles and other new forms of mobility. | <ul style="list-style-type: none"> ■ Due to the high fuel prices, drivers tend to live on a meagre income leading to poor quality of life. ■ Poor address system is a barrier to delivering goods and services to people. |
|---|---|

Stakeholders from the Delivery (Private) Sector

Table A-11: Delivery Service Perspective – SWOT Analysis of Policy and Governance Towards Current Mobility

Strengths/Opportunities	Weaknesses/Threats
<ul style="list-style-type: none"> ■ Women are not restricted from owning a and using vehicles. As long a woman can afford a vehicle, there are no restrictions to her usage. ■ E-commerce companies like Jumia use third-party logistics (3PL) companies to deliver purchased goods to customers. There is an understanding of the value chain and the need to include these third-party delivery companies as part of operations. 	<ul style="list-style-type: none"> ■ Mobility is an integral part of the economy, but the government has neglected it. Moving goods from one point to another significantly increases consumer costs. Without improved mobility systems for transport of freight/goods, prices of items on the market increase, thereby increasing cost of living. ■ The constant increase in fuel, import taxes, and government duties affect the companies' profit margin. They have to find capital to keep the business afloat. ■ Financially, the government is not capable of developing sustainable and new mobility services because of the current financial status of the economy. ■ A possible infrastructure barrier will be the inability of the nation's electricity supply to support the EV load that will be placed on it. ■ Persons with disabilities needs' are not met. They are usually ignored by trotro drivers. ■ The postal and courier services do not fully understand the operations of companies like Jumia, which only provide a platform for E-commerce. The Postal and Courier Service Regulatory Commission is the agency in charge of licensing delivery companies. They want Jumia to pay 50,000 cedis to be licensed as a delivery company. However, this should not be applicable to as they rather engage with 3PLs for deliveries to customers.

Table A-12: Delivery Service Perspective – SWOT Analysis of Socioeconomics and Organization of the Sector

Strengths/Opportunities	Weaknesses/Threats
<ul style="list-style-type: none"> ■ Fares are determined by the distance between the drop-off and the pickup location, distance traveled, and time travel to the drop-off point. Thus, creating a good pricing system. ■ A complex system called aggregation is used to aggregate orders from a catchment area to cut down on delivery charges. 	<ul style="list-style-type: none"> ■ They are a member of the Postal and Courier Services Regulatory Commission, the regulatory agency for delivery services. No benefit is derived from joining the association; the association demands a one-time licensing fee of more than 4,000 cedis. ■ ShaqExpress, for instance, has high operational costs largely due to high costs of fuel. This has caused a huge dependency on cash flow.

Table A-13: Delivery Service Perspective – SWOT Analysis of Market Potential, Clients, and User Groups for New Mobility Services

Strengths/Opportunities	Weaknesses/Threats
<ul style="list-style-type: none"> ■ There is a market for new mobility services. ■ Using electric bikes for deliveries is profitable compared to fuel-powered bikes. ■ Good mobility policies will reduce operating costs and accelerate the company's growth. ■ Good road infrastructure will also reduce the risk of wear and tear on the bikes, reducing the maintenance cost. ■ The use mobile apps to engage customers – Shaqexpress uses the Shaqexpress App, and Jumia uses Jumia Web and mobile app to engage with their product users. 	<ul style="list-style-type: none"> ■ Low penetration of technologies like payment platforms could hinder the development of new forms of mobility. ■ Electric bikes tend to move slower than fuel-powered bikes.

Stakeholders from the Resellers/Manufacturers Sector

Table A-14: Resellers/Manufacturers Perspective – SWOT Analysis of Policy and Governance Towards Current Mobility

Strengths/Opportunities	Weaknesses/Threats
<ul style="list-style-type: none"> ■ There is a general positive attitude by the government to encourage and create access to transport in the country. ■ Solar taxi has a range of vehicles for corporate institutions, schools, and eCommerce companies, farmers, hospitals, waste management operators, etc. They also have contacts with high network individuals, who serve as referral points for new customers. ■ New forms of mobility are opportunities to create access to mobility for people with disabilities. ■ Women efficiently use available current modes of transport. 	<ul style="list-style-type: none"> ■ There should be a policy focused on helping drivers renew their old vehicle fleets. ■ Inadequate/lack of charging station infrastructure is a significant barrier to adoption by drivers seeking to make long-distance trips with no charging stations along the way. ■ There is no particular mechanism or provision for people with disabilities. ■ The challenge facing the work of Volkswagen is cross-border transactions of parts from South Africa to Ghana due to the forex exchange and increase in customs duties at Ghana port. Moving vehicles from South Africa to other francophone countries is cheaper than in Ghana. ■ The government’s position on electric vehicle import taxes increases the operational costs of the company exponentially; hence tax reduction policies on new electric vehicles will accelerate the company's growth ■ Micromobility services like using bikes in the city are not accessible to women.

Table A-15: Resellers/Manufacturers Perspective – SWOT Analysis of Socioeconomics and Organization of the Sector

Strengths/Opportunities	Weaknesses/Threats
<ul style="list-style-type: none"> ■ Discounts are negotiated by the customer at the time of vehicle purchase with free items like chargers, etc. ■ The members of Ghana Manufacturer’s association are advocating for a policy to facilitate the adoption of new cars by implementing a 35% import duty and 20-35% tariffs increase on used car import. ■ Volkswagen is part of Manufacturers Associations that work with government agencies to make market penetration easier. 	<ul style="list-style-type: none"> ■ Solar Taxi does not belong to any association. ■ Imports of products are major operational expenses as well as payment of salaries. ■ There is no credit avenue for the purchase of new cars by individuals. Most car purchases are by companies and high-income earners with a lot of disposable income. This allows for the import of old, used, and non-conforming vehicles into the system.

Table A-16: Resellers/Manufacturers Perspective – SWOT Analysis of Market Potential, Clients, and User Groups for New Mobility Services

Strengths/Opportunities	Weaknesses/Threats
<ul style="list-style-type: none"> ■ There is the market potential for new mobility services and products. Solar taxi had 5,000 people willing to rent their vehicles in its first week of operations. ■ Current sales of electric vehicles are profitable even on a small scale, and it is expected to increase on a larger scale. ■ Women can play critical roles in the mobility sector, especially in male-dominated sectors like engineering and executive positions. 	<ul style="list-style-type: none"> ■ Barriers like the expensive cost of electric cars and the poor network of charging stations do not drive adoption and investment. ■ Women and disabled drivers should be given a sense of belonging and ownership of the mobility sector through partnerships with women groups and disability groups.

Stakeholders from the Public Transport Sector

Table A-17: Public Transport Sector Perspective – SWOT Analysis of Policy and Governance Towards Current Mobility

Strengths/Opportunities	Weaknesses/Threats
<ul style="list-style-type: none"> ■ The government is making progress by adapting to new services with the plan of increasing access to cleaner, safer and reliable means of transport like electric vehicles. ■ The Drive Electric policy is under formulation with key policies like creating charging stations to increase EV adoption. ■ The government demonstrates improvement in the mobility sector by facilitating the development of charging stations in Accra. ■ The Ministry is in the process of formulating policies for electric vehicles. A pivotal policy to implement will be tax waivers on the import of electric vehicles. ■ Needs for people with disabilities and women will be addressed during the stakeholder engagement process of the policy formulation for new mobility services. 	<ul style="list-style-type: none"> ■ The Ministry of Transport has a National Transport Policy to address mobility issues, but there are no actionable plans and resources to execute the policy. There should be actionable items to ease mobility for all to improve the transport system. A financial barrier is the low purchasing power of most people due to the high cost of electric vehicles. ■ Unavailability of skilled electric vehicle mechanics to repair electric vehicles compared to fuel power vehicles is a barrier to adoption. Buyers have to be assured of access to repairs and spare parts. ■ The absence of a network of charging stations in the city and during long-distance travel will discourage most people who want to purchase and use electric vehicles.

Table A-18: Public Transport Sector Perspective – SWOT Analysis of Socioeconomics and Organization of the Sector

Strengths/Opportunities	Weaknesses/Threats
<ul style="list-style-type: none"> ■ There is market potential with users and companies in the city engaging in new forms of mobility. ■ Incentives like tax waivers on the import of electric vehicles will create an enabling environment. 	<ul style="list-style-type: none"> ■ The public sector sees new forms of mobility as an opportunity to generate revenue instead of considering its environmental benefits ■ The ride-sharing concept has not been explored and will require a change in cultural orientation for its adoption.

- The private sector is leading the change in mobility with technology and infrastructure without supporting policies from the government.

Appendix 10 – Existing and Committed Power Plants in Ghana (2021)

Table A-19: Table Showing Existing and Committed Power Plans In Ghana (2021)

Power Plant	Fuel Type	Installed Capacity (Nameplate)	% Share	Dependable Capacity	
Hydro Power Plants					
Akosombo	Hydro	1,020		900	
Bui	Hydro	400		360	
Kpong	Hydro	160		140	
Sub-total		1,580	30.8	1,400	
Thermal Power Plants					
Takoradi Power Company (TAPCO)	Oil/NG	330		300	
Takoradi International Company (TICO)	Oil/NG	340		320	
Sunon–Asogli Power (SAPP)	NG	560		520	
Tema Thermal Plant1 (TT1P)	Oil/NG	110		100	
Tema Thermal Plant2 (TT2P)	Oil/NG	87		70	
CENIT Energy Ltd (CEL)	Oil/NG	110		100	
KTPP	Oil	220		200	
AMERI	NG	250		230	
Karpower (power rental)	HFO	470		450	
AKSA	HFO	370		350	
Cenpower	Oil/DFO	360		340	
Amandi*	Oil/NG	203		190	
Early Power*	Gas/LPG	144		140	
Sub-total		3,554		69.2	3,310
Genser	NG/LPG	95			85
Sub – total (incl. embedded gen.)		3,649	68.5	3,395	
Renewables (excl. large hydro)					
VRA Solar (Navrongo)	Solar	2.5		2	
Meinergy Solar	Solar	20		16	
BXC Solar	Solar	20		16	
VRA Solar (Lawra)	Solar	6.5		4.5	
Tsatsadu Hydro	Hydro	0.045		0.045	
Bui Solar	Solar	50		45	
Safisana Biogas	Biogas	0.1		0.1	
Sub – total		99.145		1.9	83.645
Total (incl embedded gen.)		5,328.1		4,878.6	
Total (excl embedded gen.)		5,134.0		4,710.0	

*Completed and undergoing test-run for commissioning sometime in 2021

Appendix 1 1 – Potential Future Demand Sensitivity Analysis

Table A-20 : Projection of Future Public Transport Demand

	2022	2025	2030	2035
Total Annual Trips (1)	3 278 400 000	3 681 600 000	4 193 280 000	4 704 000 000
Total Motorized Annual Trips (1)	2 294 880 000	2 577 120 000	2 935 296 000	3 292 800 000
Public Transport (PT) Annual Trips (64%) (2)	1 468 723 200	1 649 356 800	1 878 589 440	2 107 392 000
Private Vehicle (PV) Annual Trips (36%) (2)	528 740 400	593 768 400	676 292 200	758 661 100
Estimations with data from 1) 2016 Koica Master Plan; 2) Ghana Urbanization Review Phase 1 report				
0,1% PT Annual Trips	1 468 800	1 648 000	1 878 400	2 108 800
0,2% PT Annual Trips	2 937 600	3 299 200	3 756 800	4 214 400
0,3% PT Annual Trips	4 406 400	4 947 200	5 635 200	6 323 200
0,4% PT Annual Trips	5 875 200	6 598 400	7 513 600	8 428 800
0,5% PT Annual Trips	7 344 000	8 246 400	9 392 000	10 537 600
1% PT Annual Trips	14 688 000	16 492 800	18 787 200	21 075 200
2% PT Annual Trips	29 376 000	32 985 600	37 571 200	42 147 200
3% PT Annual Trips	44 060 800	49 481 600	56 358 400	63 222 400
4% PT Annual Trips	58 748 800	65 974 400	75 142 400	84 294 400
5% PT Annual Trips	73 436 800	82 467 200	93 929 600	105 369 600
6% PT Annual Trips	88 124 800	98 960 000	112 716 800	126 444 800
7% PT Annual Trips	102 809 600	115 456 000	131 500 800	147 516 800
8% PT Annual Trips	117 497 600	131 948 800	150 288 000	168 592 000
9% PT Annual Trips	132 185 600	148 441 600	169 072 000	189 664 000
10% PT Annual Trips	146 873 600	164 934 400	187 859 200	210 739 200
0,1% PV Annual Trips	528 000	595 200	675 200	758 400
0,2% PV Annual Trips	1 056 000	1 187 200	1 353 600	1 516 800
0,3% PV Annual Trips	1 587 200	1 782 400	2 028 800	2 275 200
0,4% PV Annual Trips	2 115 200	2 374 400	2 704 000	3 033 600
0,5% PV Annual Trips	2 643 200	2 969 600	3 382 400	3 792 000
1% PV Annual Trips	5 286 400	5 939 200	6 761 600	7 587 200
2% PV Annual Trips	10 576 000	11 875 200	13 526 400	15 174 400
3% PV Annual Trips	15 862 400	17 814 400	20 288 000	22 758 400
4% PV Annual Trips	21 148 800	23 750 400	27 052 800	30 345 600
5% PV Annual Trips	26 438 400	29 689 600	33 814 400	37 932 800
6% PV Annual Trips	31 724 800	35 625 600	40 576 000	45 520 000
7% PV Annual Trips	37 011 200	41 564 800	47 340 800	53 107 200
8% PV Annual Trips	42 300 800	47 500 800	54 102 400	60 694 400
9% PV Annual Trips	47 587 200	53 440 000	60 867 200	68 278 400
10% PV Annual Trips	52 873 600	59 376 000	67 628 800	75 865 600

Appendix 12 – Strategic Objectives of New Mobility Services

Table A-21 : Strategic Objectives for Stakeholders of Urban Mobility

Users	Operators / Private Sector	Public Sector
Affordability	High user uptake, profitability, and financial viability (good financial results)	Affordability for all (ensure low income-tariffs)
Accessibility to all users (“door to door accessibility”)	Operational efficiency (including avoiding low density areas).	Accessibility in underserved areas by public transport (PT) and ensure service for people with disabilities and specific needs.
Safety conditions / appropriate infrastructure and traffic conditions.	Remove barriers to use and provide best user experience: insure integration with public transport network.	Safety for all public space users, with adequate, safe, well designed and maintained transport infrastructures.
Efficiency (time saving)	Best user experience for all market segments: insure adequate vehicle efficiency and technological conditions.	Adequate, well designed, and maintained transport infrastructures and parking, based on a well-structured public transport network and NMT solutions.
Availability and reliability.	Avoid low scale operations.	
Sustainability (low/zero emission mobility).	Energy efficiency of vehicles and operations (which would promote a low environmental impact).	Sustainable development / mobility for all, towards low/zero-emission operations and energy efficiency, no gig-economy; Local/national economy-based solutions.

Appendix 13 – Barriers to New Mobility Services

Table A-22: Summary of the Main Barriers

Barriers
General mobility/transportation
Policy, regulatory and institutional
<ul style="list-style-type: none"> ■ Despite existing policy documents in relation with the mobility sector, there are no actionable plans and resources to execute/implement the policies. ■ Limited budgetary resources to tackle issues in the transportation sector. ■ Overall lack of infrastructure for sustainable modes (such as bus lanes, bike lanes and charging for electric bicycles), and policies to ensure its provision, which would improve the safety of bike users in particular and all uses in general, as well as incite the adoption of e-mobility services. ■ Existing regulations do not safeguard the specific mobility needs of people with disabilities or specific groups (like women). ■ Poor regulations or lack of enforcement of existing regulations, including regarding fuel management. ■ Institutional barrier to adopting new technologies, as well as barriers towards regulations concerning the advancement of more sustainable or emerging technologies. ■ Low standards regarding fuel and vehicle characteristics. The conditions to import vehicles disincentivize the use of energy-efficient vehicles (including vehicle parts): <ul style="list-style-type: none"> ○ For example, since 2015 the import duty (CET Act of 2015, Act 905), high-capacity buses are not exempt from import duty. ○ Also, instead of supporting vehicles with lower engine displacement, often more efficient, the Act imposes 10% import duty on vehicles with engine capacity of above 1500 to 1900 cc. <p>Electric Mobility</p> <ul style="list-style-type: none"> ■ <i>Government's lack of long-term planning and goals setting.</i> ■ <i>Absence of an Annual Tax Exemption Policy.</i> ■ <i>Absence of awareness creation about Evs.</i>
Economic and financial
<ul style="list-style-type: none"> ■ Deteriorated economic situation (inflation rate of 40%). ■ Increase in fuel prices which have a direct impact in transportation costs for operators and users. ■ No support exists for entrepreneurs who provide carbon emission-free and sustainable forms of mobility. ■ There is no credit avenue for the purchase of new cars by individuals, inducing the import of old, used, and non-conforming vehicles into the system. ■ Conditions to import vehicles and vehicles parts have an impact in the operational costs. ■ App maintenance, payroll, driver and rider support, as well as fuel are the highest operational cost for companies. ■ The current government's position on electric vehicle import taxes increases the operational costs exponentially. ■ There are no associations and unions tailored to ridesharing-hailing or carpooling services. (Uber has a global position not to join local unions). <p>Electric Mobility</p> <ul style="list-style-type: none"> ■ <i>Higher purchase price of EVs, due to higher manufacturing costs.</i>

- *Battery Replacement Cost.*
- *Higher Electricity Price for Charging.*
- *Lack of Credit Access for EVs.*

Infrastructure

- Lack of a well-structured public transport network, including mass transit solutions.
- Focus on hard road infrastructures with a clear lack of infrastructure for sustainable modes (such as bus lanes, bike lanes and charging for electric bicycles), which would improve the safety of bike users and all users in general, as well as incite the adoption of e-mobility services.
- Poorly maintained roads, which is detrimental to any new vehicle.
- Lack of traffic management measures and road safety measures.

Electric Mobility

- *Insufficient charging stations and cost of construction of charging infrastructure.*
- *Long charging Time.*
- *Unreliable power supply.*
- *Lack of repair and maintenance workshops, as well as trained mechanics.*
- *No EV domestic industry, which makes servicing cumbersome.*

Technical

- Low standards regarding vehicle characteristics, including for public transport services.

Electric Mobility

- *Limited range, especially for people travelling long distances (inter-city).*
- *Lack of evidence on reliability and performance, as compared to internal combustion engine vehicles (ICEVs).*
- *Limited battery life (eight to ten years).*
- *Limited EV models, restricting users' and operators' choices.*
- *Limited know-how on repairs & maintenance.*

It is important to highlight that the *National Electric Mobility Policy and Market Readiness for Ghana (2022)* refers that the **top priorities for eMobility in Ghana are Buses for public transport and Cars for personal transport. This should not be translated in regulations and financing that do not include other vehicles, such as electric 2-wheelers or 3-wheelers.**

Social/Users

- Current transportation costs are considered too high, and users are unwilling to pay more.
- Safety and traffic conditions were also identified as a major concern, as well as the lack of adequate infrastructures.
- Despite some informal groups, there is an absence of interest groups representing transport users in general (public transport, road users, pedestrians, other).

Electric Mobility

- *Lack of knowledge on EVs, allaying fears and misconceptions.*
- *Limited understanding of the quality and safety of EVs.*
- *Lack of awareness about the emission reduction potential of EVs.*

Table A-23: Potential for Public Transport Services: Barriers and Opportunities

Services	Barriers	Opportunities
Existing services with potential to be scale-up		
Bicycles on rent	<ul style="list-style-type: none"> Limited trip distance Lack of dedicated infrastructure and safety conditions; current traffic conditions do not encourage the use of 2 wheelers Potential user: Low probability of a modal shift from private cars' users 	<ul style="list-style-type: none"> Flexibility of services; door to door accessibility, and last mile connection. Potential lower cost for the user when compared to other mobility services. Potential user: current troto/bus user
Corporate car-sharing	<ul style="list-style-type: none"> Cost for the user/potential user: given the potential cost for the operator, sporadic modal shift from public transport' users. 	<ul style="list-style-type: none"> Cost for the user/potential user: high probability of a modal shift from current private cars' users; people with disabilities.
Carpooling	<ul style="list-style-type: none"> Cost for the user: given the potential cost for the operator, low probability of a modal shift from public transport' users. Difficulty in terms of available parking spaces at origin and destination. Private security concerns. 	<ul style="list-style-type: none"> Cost for the user/potential user: current private car' users.
Ride-hailing taxis (adapted for people with disabilities, small cargo)	<ul style="list-style-type: none"> Cost for the user: given the potential of such vehicle cost for the operator. 	<ul style="list-style-type: none"> Absence of such service on the market.
Non-existing services with potential		
Public car-sharing	<ul style="list-style-type: none"> Effective capacity of public institutions to put in place shared mobility system (usually provided by private companies). Cost for the user: given the potential cost, low probability of a modal shift from public transport' users. Difficulty in terms of available parking spaces at origin and destination. 	<ul style="list-style-type: none"> Cost for the user /potential user: high probability of a modal shift from current private cars' users or users who would otherwise buy a new / used car (limiting motorization growth).
Sharing system of electric (and non-electric) 2 and 3 wheelers	<ul style="list-style-type: none"> Limited trip distance Lack of dedicated infrastructure and safety conditions; current traffic conditions do not encourage the use of 2 or 3 wheelers Potential user: Low probability of a modal shift from private cars' users 	<ul style="list-style-type: none"> Flexibility of services; door to door accessibility, and last mile connection. Potential lower cost for the user when compared to other mobility services. Potential user: current troto/bus user
Airport shuttles to major terminals and urban centres	<ul style="list-style-type: none"> If traffic congestion remains unchanged, there is no clear advantages for users, when comparing to existing services (from hotels or the use of taxis) 	<ul style="list-style-type: none"> If a more attractive and comfortable service (quality and safety) is provided, people may be tempted.

Table A-24: Potential for Other Existing and Non-Existing Services to be Scaled-Up: Barriers and Opportunities

Services	Barriers	Opportunities
Existing services with potential to be scaled-up		
Electric 2- and 3-wheelers (bikes, bicycles, cargo bikes or tricycles),	<ul style="list-style-type: none"> Scaling-up due to investment and operational costs 	<ul style="list-style-type: none"> Already used by few companies in Ghana, such as ShaQ Express or Jumia <p>The two electric bicycles that ShaQ Express are currently piloting were purchased from CargoBikes and have an autonomy of 70km. Maintenance is cheaper than a bike, and speed is comparable (45-50 km/h). Companies pays between 30 and 40 GHC everyday to use a bike. The International Climate Initiative funded by the federal German government through the Ministry of Environment, is also piloting “made in Ghana” electric cargo bikes, through a partnership between Impact Hub Accra and Siemens Stiftung.</p>
Non-existing services with potential		
Non-motorized 2 wheelers	<ul style="list-style-type: none"> Longer distances. 	<ul style="list-style-type: none"> For trips of less than 3 kilometers, on a flat surface, bicycles are a viable alternative to motorized 2-wheelers.
Non-motorized 3 wheelers	<ul style="list-style-type: none"> Heavy cargo and longer distances. 	<ul style="list-style-type: none"> For short trips with light cargo.
Light-duty vehicles on lease or an a shared-basis	<ul style="list-style-type: none"> Investment cost and cost for the user. 	<ul style="list-style-type: none"> For specific services, which are willing to pay.

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