



# 29th CIRP Life Cycle Engineering Conference

Electrically powered micro mobility vehicles in Ghana:  
transition process with focus on social acceptance

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# Agenda



1. Introduction: Mobility in Ghana at a glance
2. Potential for Sustainable Mobility & Research Questions
3. Methodology
4. Results
5. Discussion & conclusions
6. Sources

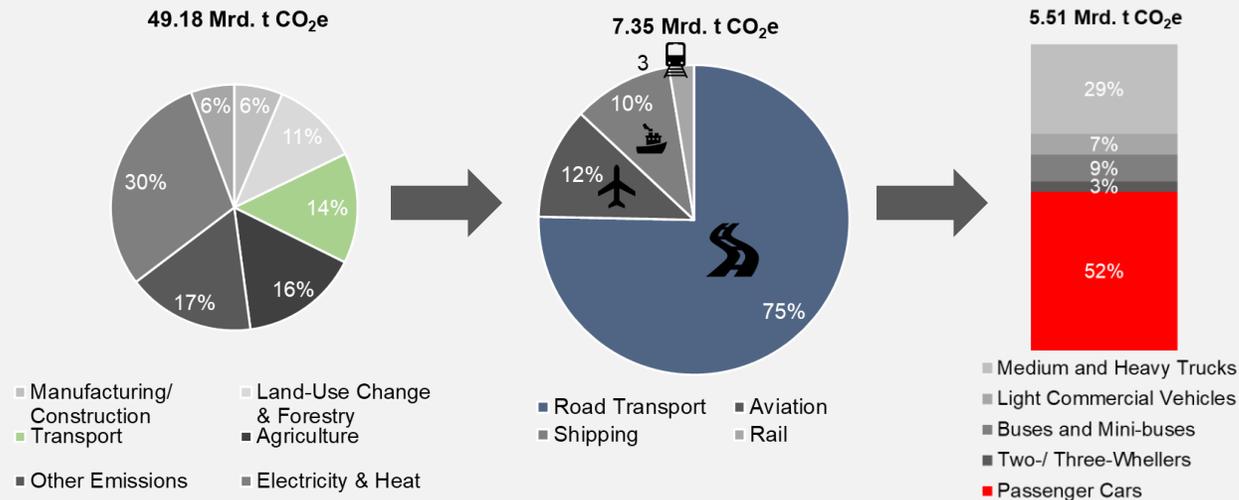
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# Introduction: Mobility in Ghana at a glance

## Population and economic growth presents complex mobility challenges

- Ghana is experiencing an economic and population boom 30Mio (2020 ) to projected 52Mio (2050) [1][2]
- Increasing number of cars or mopeds on the road-2.5 Mio vehicles contributed to 44% of Ghana’s 2016 emissions.[1]

## Share of Transport in Global Greenhouse Gas Emissions (2016) [3]



# Potential for Sustainable Mobility & Research Questions

## Sustainable Mobility Potential [4][8][9]

- Increase in community relationship (when used in a sharing setting)
- Possible reduction of traffic congestion (for short trips)
- Reduction of direct emission levels.
- Reduction in travel time
- improvement in the health of the population
- Reduction in cost of transport given fossil fuel costs and potential for renewable energy powered mobility.

## Research Questions

- What factors are likely to influence the social acceptance of electromobility vehicles in Ghana?
- What factors are likely to influence the social acceptance of a sharing system for light electric vehicles in Ghana?



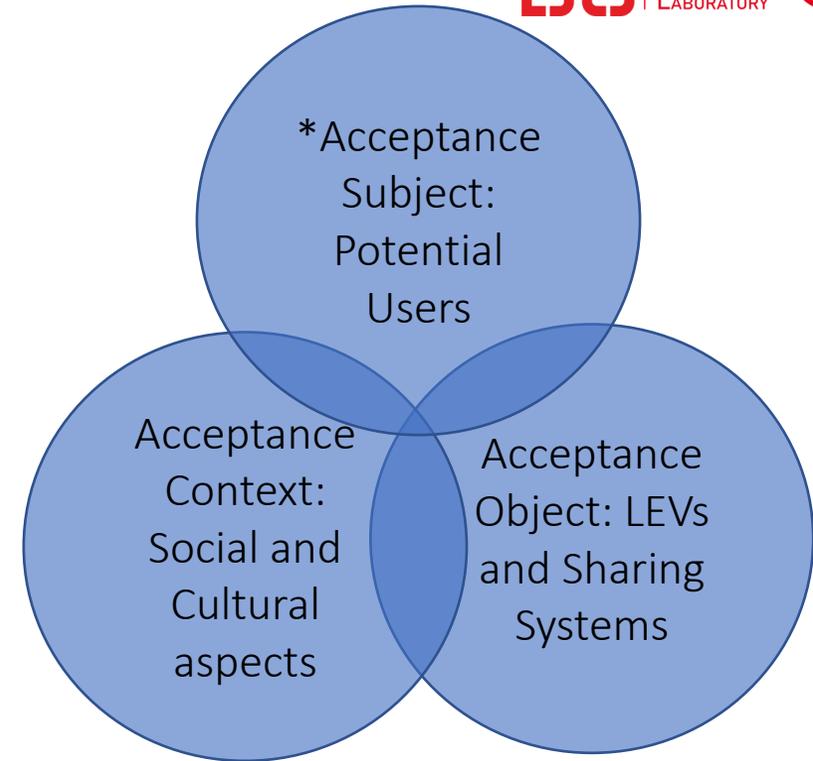
# Methodology

## Theoretical Framework

- Focus on technology acceptance in the local environment.
- Using the principles developed by Schaefer et. al, focus was on the acceptance subject. [5]
- Investigation done using the mixed approach (qualitative and quantitative surveys) which is generally acceptable for Technology Acceptance Models (TAM) [6]

## Survey Deployment and Analysis

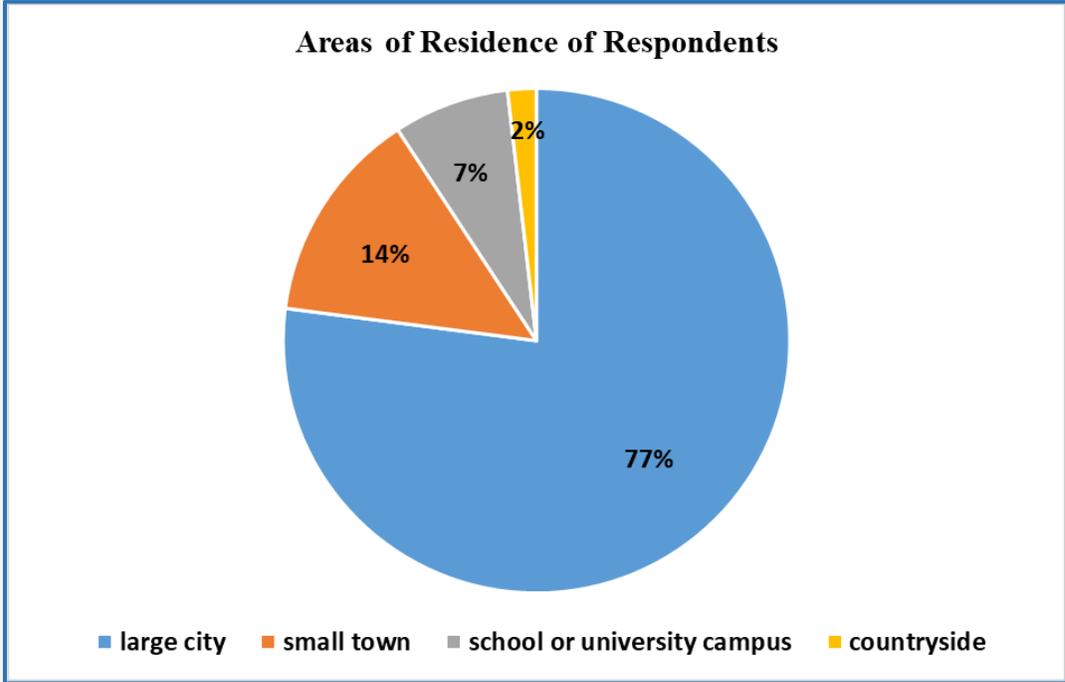
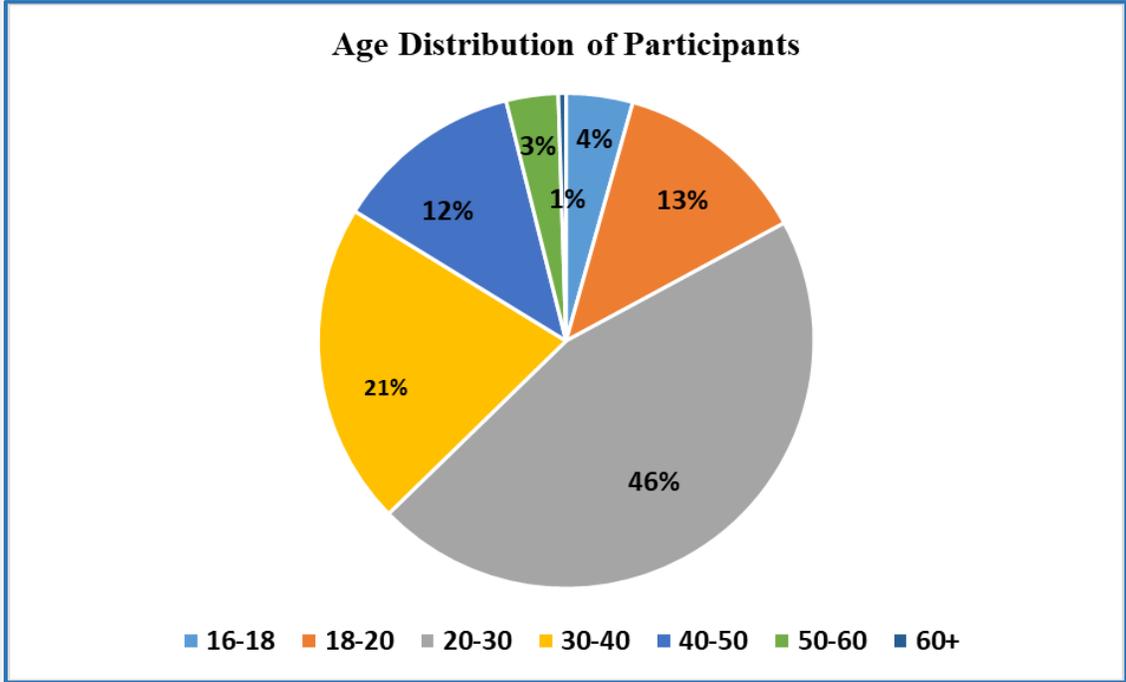
- The survey was developed on HSBO internal survey system
- With local partners Don Bosco, KNUST, UENR and HopIn Academy 1.604 persons were interviewed on their mobility needs and choices with conventional motorbikes as the closest devices to LEVs.
- Results were then analyzed descriptively and where a Lickert scale was used, Kendall's Coefficient of concordance and the Friedman's test was used by means of a statistical software [10]



*Fig. 1. Own illustration, Social acceptance based on Schäfer et al.[6]*

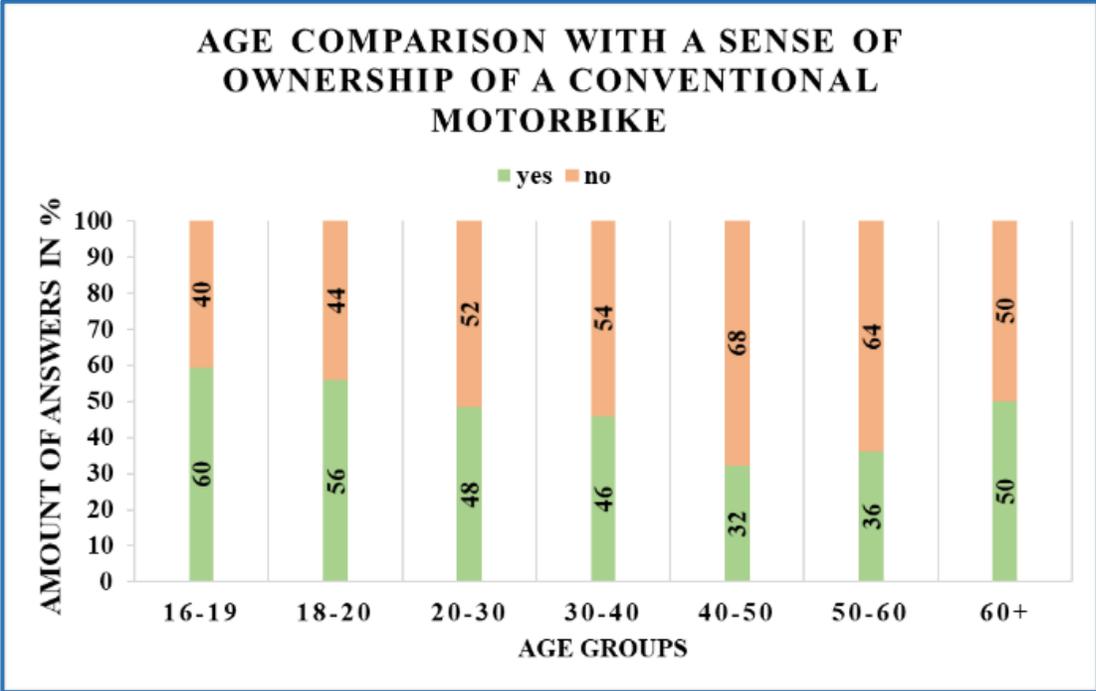
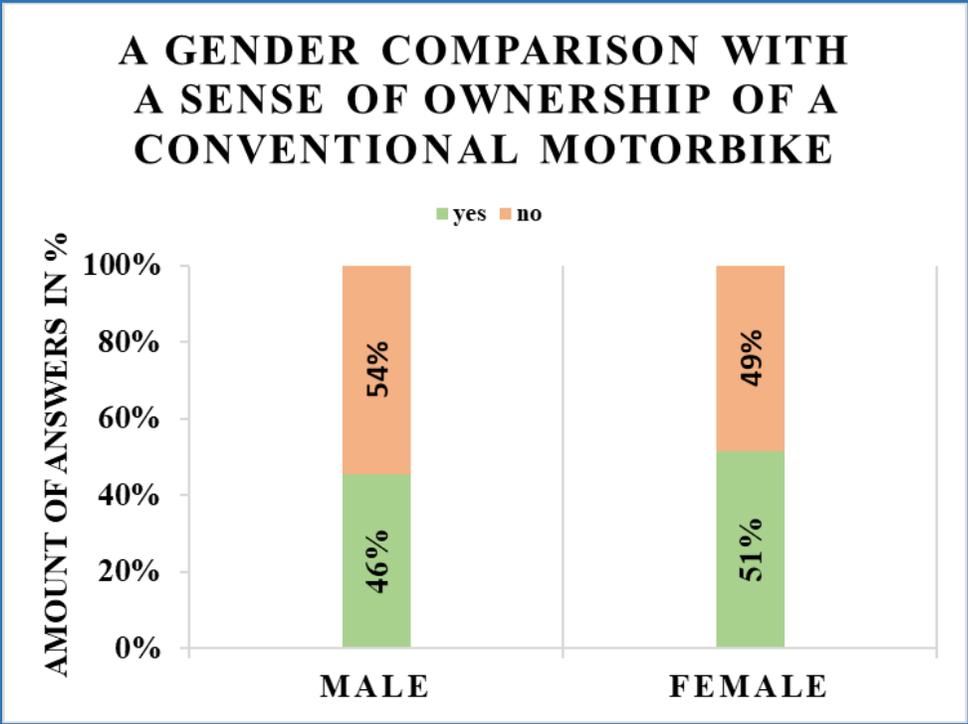
# Results: Who did we talk to and where?

## Demography



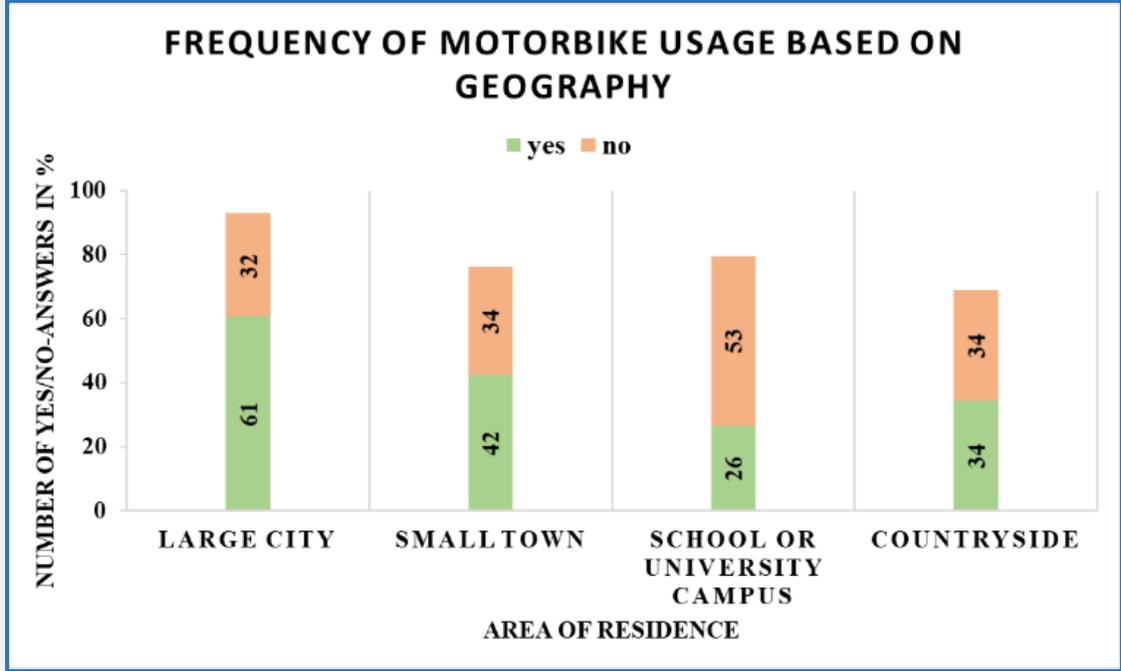
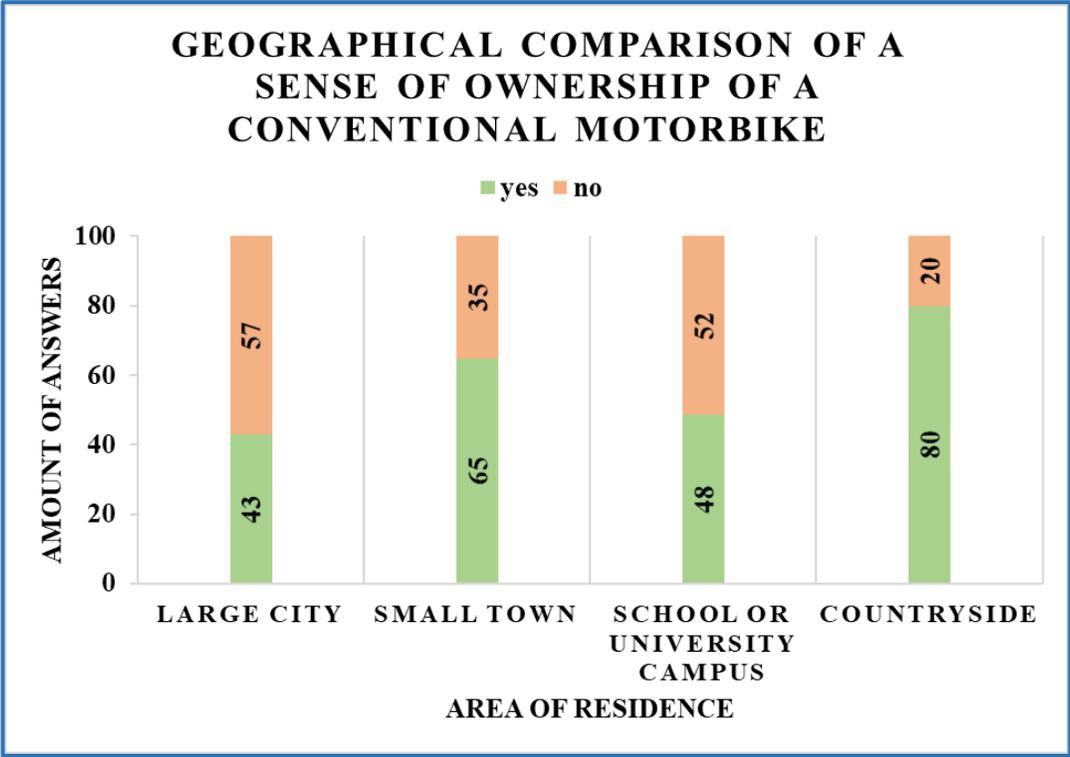
# Results: How do they feel about their motorbikes?

## Comparisons of age, gender and ownership



# Results: How do they feel about their motorbikes?

## Comparison of geography and ownership



# Results: How much do they spend on transportation?

## Relatively low amounts on monthly transport

How much do you spend on transportation in a month?	(%)
Below EUR 7.02	14.00
Between EUR 7.02-14.05	25.00
Between EUR 14.05-21.07	12.00
Between EUR 21.07-28.12	19.00
Between EUR 28.12-42.21	16.00
Between EUR 42.21-70.35	8.00
Between EUR 70.35-141.23	4.00
Between EUR 141.23-282.47	2.00

# Results : Social Acceptance of LEVs

## Factors influencing the selection and usage of a conventional motorbike

What is important to you regarding a motorbike? (Factors)	Mean Score	Rank
Safety	5.55	1st
Acquisition cost	5.87	2nd
Fuel/energy cost	6.06	3rd
Repairability	6.60	4th
Comfort	6.65	5th
Fuel Range	6.71	6th
Power	7.03	7th
Design	7.95	8th
Low noise	7.98	9th
Weight capacity (load capacity)	8.42	10th
Loading flexibility	8.64	11th
Number of possible passengers	9.10	12th
Environmental Sustainability	9.21	13th
Weather protection	9.24	14th

# Results : Social acceptance of sharing systems

## Factors likely to influence the use of a sharing system

What would be important to you regarding a motorbike sharing systems? (Factors)	Mean Score	Rank
Price	4.18	1st
Time saving	4.31	2nd
Location	4.41	3rd
Reliability	4.46	4th
Available pick-up locations	4.48	5th
Easy usage	4.55	6th
Variety of bikes	4.76	7th
Range	4.85	8th

# Results and Conclusions: Social Acceptance of LEVs & sharing systems

## Key Discussion Points

- Environmental sustainability is not a priority in Ghana
- For a sharing systems; price, time savings, location and the reliability of devices are key
- Sustainable mobility is intersectional with social issues such as gender empowerment [7]
- Ownership of devices especially in rural settings is viewed as status symbol. This may inhibit sharing

## Limitations

- Respondents had no experience with an actual sharing system.
- LEVs are not readily available in the target country hence conventional motorbikes used as an approximation.

## Next Steps for LEV's in MoNaL

- Installation and commissioning of the electric vehicles at the project pilot site.
- Installation and use of sharing software for the use of LEVs.
- Testing of LEVs and prototypical adaptations according to testing results



*Delivery of e-cargo bikes from the Netherlands to Don Bosco Campus*



# Thank you for your attention!

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