

User Needs Assessment – City Report

City: Quito

Project SOLUTIONS+

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This document complements the User Needs Assessment Guideline.

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1 Approach

Quito, Ecuador's capital, aims to develop demonstration actions directing to improve passenger connectivity and last mile deliveries by implementing small electric vehicles (2-, 3-, and 4-wheelers) in the Historic Center of Quito (HCQ) to become a low- emission zone (LEZ). The user needs assessment (UNA) for the city of Quito is carried out to identify the user needs, expectations and preferences that must be taken into account to assist the city ambitions directing to improve passenger connectivity and last mile deliveries by implementing small electric vehicles (2-, 3-, and 4-wheelers) in the Historic Center of Quito (HCQ), which aims to become a low- emission zone (LEZ). Therefore, information was gathered on the city's background, current mobility situation and to ascertain the desired solutions as well as available options to support decision making. For this purpose, two qualitative methods were applied: online survey and interviews.

1.1. City report objectives

The main objective of this city report is to present the user needs methodology approach implemented for Quito by identifying the steps undertaken and the team involved. In addition, this report presents an overview of the user needs findings and self-reported responses covering the topics pre-defined by the project SOLUTIONSplus consortium team of Work Package 1, (DLR and VTT, 2020).

This report is organized as follows. The first section presents the key stakeholders whose perspectives, experiences and strategies were the basis to conduct the UNA. Section 2 presents the responses collected through the online survey. Section 3 presents the results of stakeholders' interviews.

1.2. User needs assessment steps and team involvement

The UNA research approach consisted of an online survey and semi-structured interviews involving key stakeholders for Quito municipality and was conducted according to the instructions on the SOLUTIONSplus project user needs assessment (DLR and VTT, 2020).

Quito's city team involved with the UNA activities consisted of the following partners: city representatives, WP1 representatives (VTT) and WP4 representatives (WI and UEMI).

The activities undertaken for the UNA implementation involved three major steps with the contribution of city teams as summarized below.

- First, key stakeholders were identified by the city representatives with the support of the WP4 representatives.
- Second, an online survey and interviews were conducted by the city representatives with the support of the WP4 representatives.
- Third and last, results of the UNA were documented and reported by WP1 (VTT) and WP4 (WI and UEMI) partners.

Table 1 identifies targeted stakeholders and the corresponding group that were selected to carry out the UNA with the application of an online survey and semi-structured qualitative interviews. Based on the stakeholder relevance for Quito’s e-mobility solutions matter, stakeholders were invited to participate in both online survey and interview, whereas others were invited to participate in the online survey only which link was sent by the City Teams by email. For those stakeholders taken part in both methods (online survey and interview), the survey was filled in during the schedule allocated to conduct the interview.

TABLE 1: Selected stakeholders and applied research methods for Quito’s UNA.

Stakeholder		Method and Sample Size	
Stakeholder group	Organisation Name	Online Survey (N)	Interviews (N)
National / regional / local authorities	Mobility Secretariat	3	1
	Environment Secretariat	3	1
	Territory Habitat and Housing Secretariat (STHV)	1	1
	Urban Planning Metropolitan Institute (IMPU)	1	
	Central District Administration (CDA)	1	1
	Metropolitan Control Agency (AMC)	1	
	C40	1	
Public transport company	Metropolitan Public Transportation Company (EPMPTQ)	1	1
Passenger / individual traveller / consumer	Historic Centred Buró (HCB)	1	1
Original equipment manufacturers (OEMs)	SIDERTECH	1	1
Service providers (delivery services) ()	Bixi Mensajería Tulcán y Bixi Cargo Ecuador	1	1
Electricity and charging infrastructure companies	ABB Ecuador	1	1
Academia/ Research	Institute for Innovation in Logistics and Productivity (CATENA-USFQ)	1	1
	International University of Ecuador (UIDE)	1	

In total, 14 key stakeholders were involved in the UNA for the city of Quito leading to the completion of 19 online surveys and the selection of four interviews that were selected for presentation in this city report. Those stakeholders represent different participants groups, such as National and local authorities, public transport companies, service providers and academia and research. The online survey and interviews were conducted between November and December 2020.

2 Results – Survey

The survey data was collected by using a self-completion online questionnaire consisting of twenty-four items measured using five-point Likert scale from -2 “not at all important” to 2 “very important”, multiple-choice questions and open questions. The survey included five major sections: city identification (Question 1), city aims (Questions 4 to 11), implementation (Questions 12 to 18),

obstacles, limitations and barriers (Questions 19 to 21), and finally, background questions (Questions 22 to 26).

Quito’s online survey responses were gathered across 19 key stakeholders representing the six participant's group previously identified in Table 1. The participant's ages ranged from 29 to 52 years (M=38,54 yr , SD ±7,80). A copy of Quito’s online survey responses can be accessed here [Online Survey QUITO responses040121.xlsx](#) .

2.1 Quito city aims

For city aims questions (items 4 to 11), using five-point Likert scale, the importance rating assigned by stakeholders was computed based on the counts of each point Likert scale (e.g. stakeholder response “-2”) and its corresponding weighting factor (e.g. “-2” for point scale “-2”) as presented in the equation below. An overview of the online survey responses and importance assigned by stakeholders with respect to city aims are presented through Figure 1 to Figure 4.

$$Importance\ Rating = \frac{[Count("-2") * (-2) + Count("-1") * (-1) + Count("0") * (0) + Count("1") * (1) + Count("2") * (2)]}{Number\ of\ responses}$$

The most important aim for the city is “To analyse costs related to the implementation of e-vehicles” with importance assigned by stakeholders of 1,68, as shown in Figure 1.

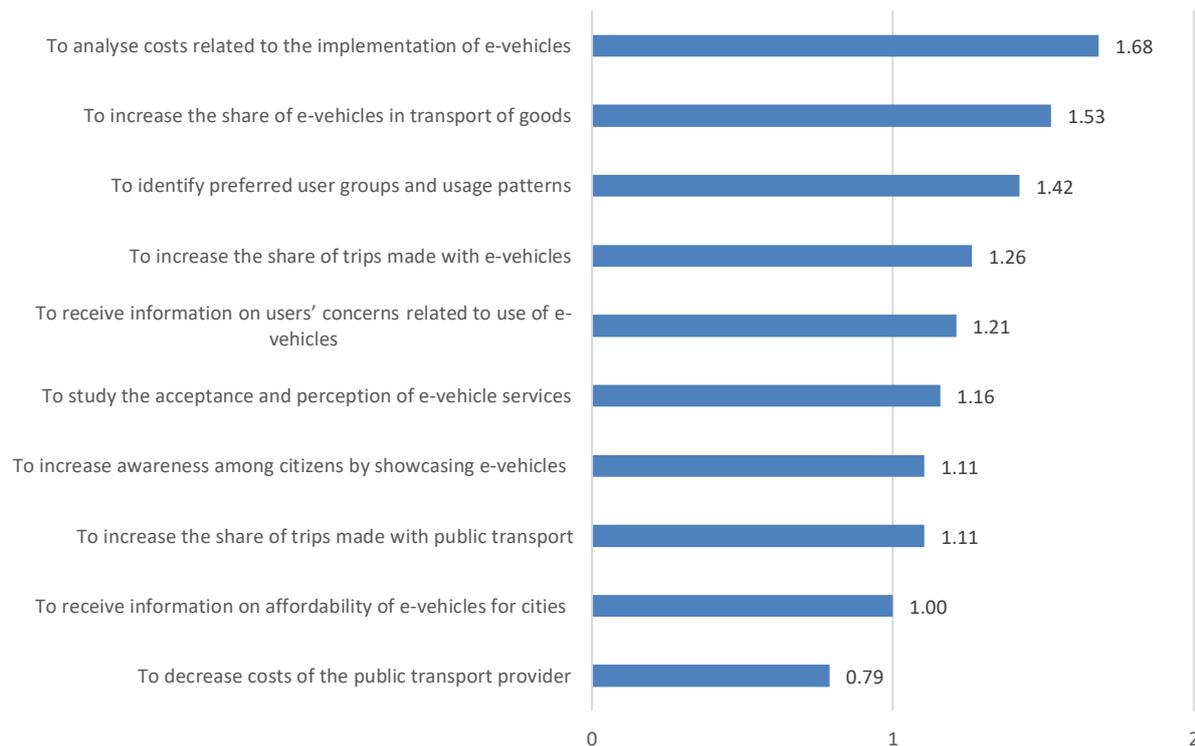


Figure 1: City aims related to usage and user acceptance of e-vehicles and importance assigned by stakeholders (Likert scale -2 “not at all important” to 2 “very important”).

Other important aims regarding usage and user acceptance referred by the stakeholders (accordingly to the open question 5) are summarised as follows:

- To identify the user's perception of change, what benefits the user receives when using electric vehicles;

- To generate passenger connectivity and last-mile logistics efficiency in pedestrianized areas;
- To identify the importance of sustainable urban mobility as a mechanism for economic reactivation; mitigation of environmental impacts and strengthening of the social fabric;
- To determine what the mobility needs are in the Historic Center (e.g. commerce, tourism);
- And to collect information on the purchasing power of the user to electric vehicles.

For the city mobility patterns, the most important aim is *“To support multimodal travel chains”* (1,59), in Figure 2.

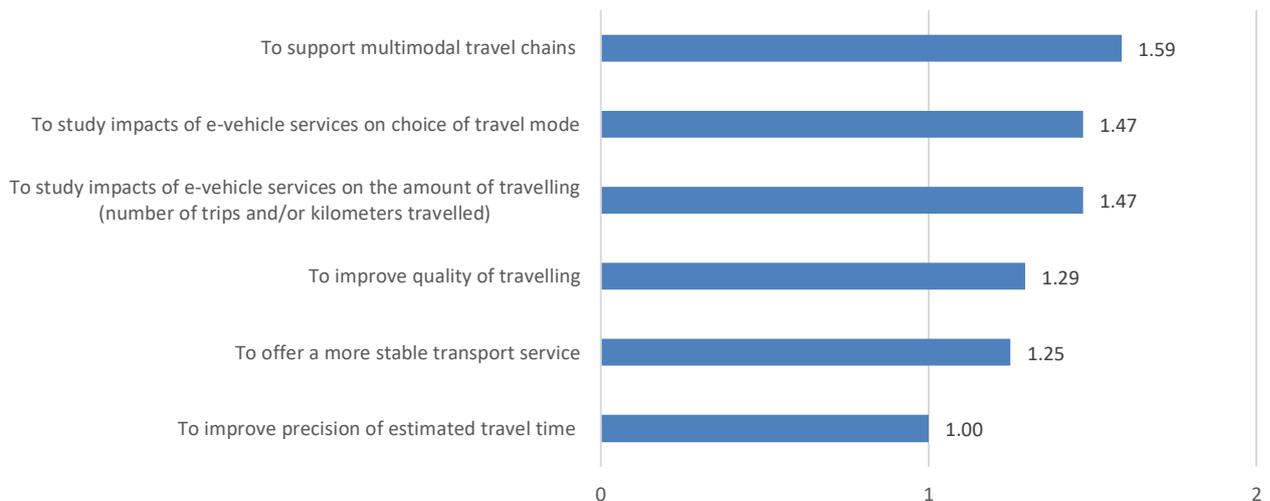


Figure 2: Mobility patterns aims and importance assigned by stakeholders (Likert scale -2 “not at all important” to 2 “very important”).

Other mobility aims identified by Quito’s stakeholders are (accordingly to the open question 7):

- To create solutions for last mile for LEZ;
- Facilitate access to the historical centre of the city;
- And study the need for incentives that could promote these mobility solutions.

For the city environment, the two most important aims are *“To reduce pollution”* and *“To reduce CO2 emissions”* (1,94), as shown in Figure 3.

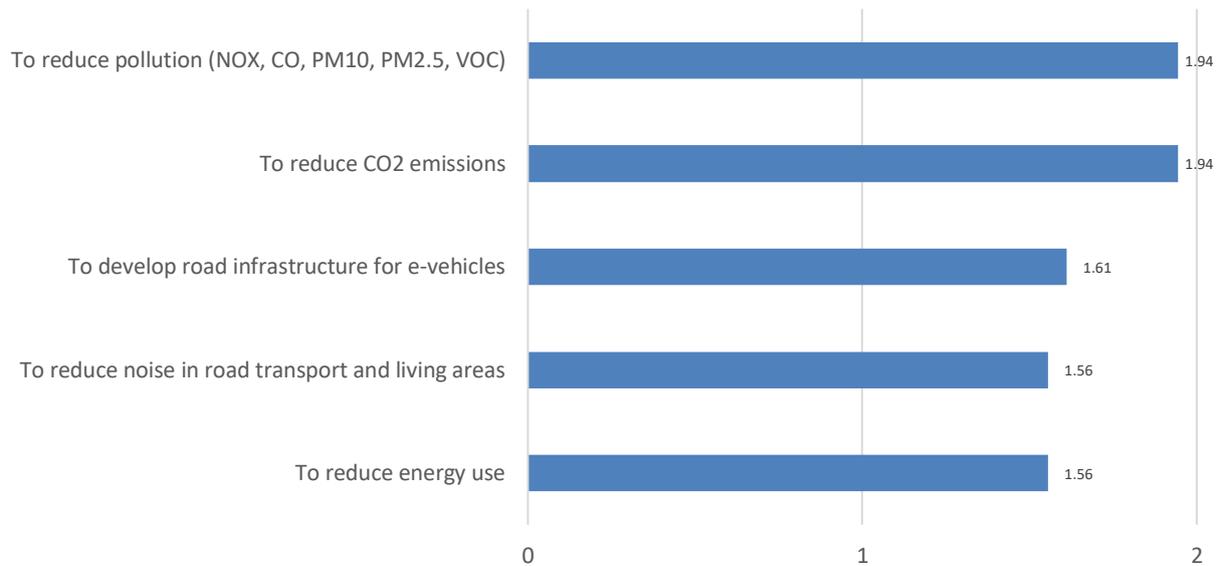


Figure 3: City environment aims and importance assigned by stakeholders (Likert scale -2 “not at all important” to 2 “very important”).

Other city environment aims include:

- To promote environmental education and public awareness;
- And to improve “public distribution” by increasing the space allocated to non-motorized transport vehicles or motor vehicles with better sustainability.

For the quality of life in the city, the most important aim is “*To improve public health in general, esp. by reducing exposure of citizens to air pollution*” (1,72), in Figure 4. In addition, “*To enhance job creation*” was also considered very important (1,56).

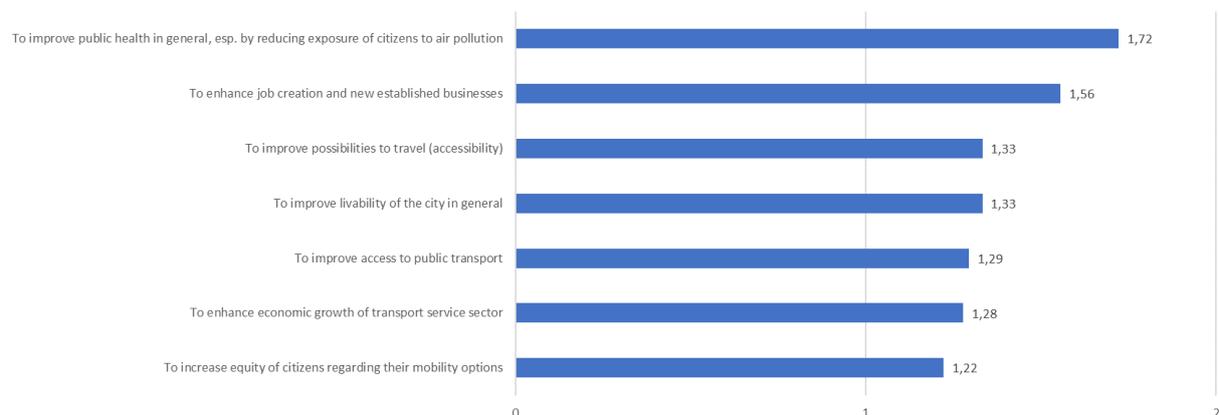


Figure 4: Quality of life in the city aims and importance assigned by stakeholders (Likert scale -2 “not at all important” to 2 “very important”).

Other city environment aims include:

- To increase coexistence between users of different modes of transport;
- To boost the economy of the transport sector and other sectors in the CHQ through the generation of green jobs.
- And contribute to the generation of new business models.

2.2 Implementation

For implementation questions (items 12 to 18), the results are presented based on the counts for each multiple-choice question options. An overview of stakeholder’s responses with respect to the city e-vehicles implementation is presented next. For the targeted use cases for e-vehicles in Quito city, last/first mile delivery was identified by 18/19 stakeholders, followed by the transport of people (16/19) (Figure A, in the Appendix).

Other targeted use cases include recollection of wastes, maintenance and food truck and cleaning parks, botanical gardens and tourism.

All the responders (19/19) identified “*Transport of people / delivery of goods in city centre*” as an area where e-vehicles will be used, (Figure B, in the Appendix).

In the transport of people, all citizens were the targeted user group of the e-vehicles with more relevance identified by stakeholders (11/19), followed by people with disabilities and senior citizens (6/19), in Figure 5. Other user groups were: pregnant women; families, logistics and tourism.

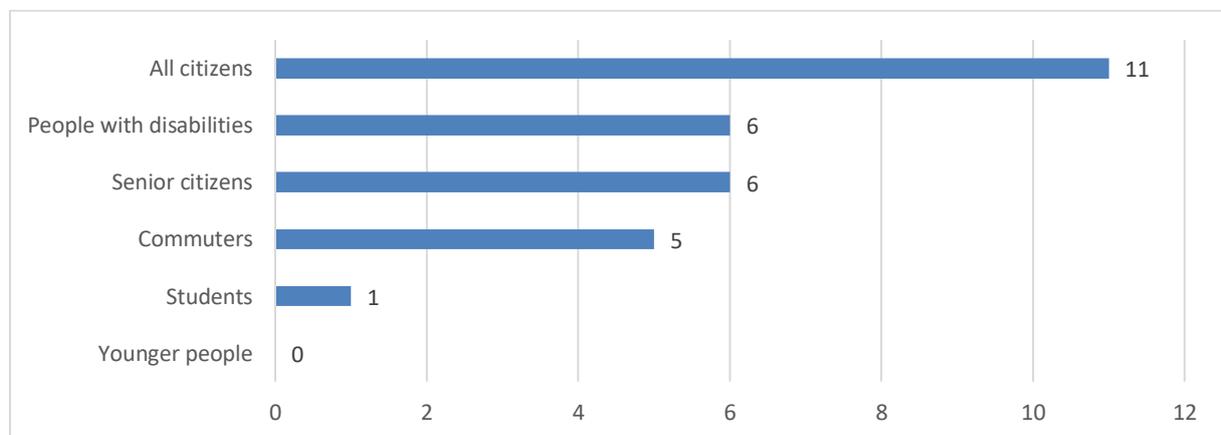


Figure 5: Targeted user groups of the e-vehicles for the transport of people (N=19).

E-vehicles may be used most for commuting (15/19), followed by shopping (11/19) and other job related trips (10/19), as shown in Figure 6.

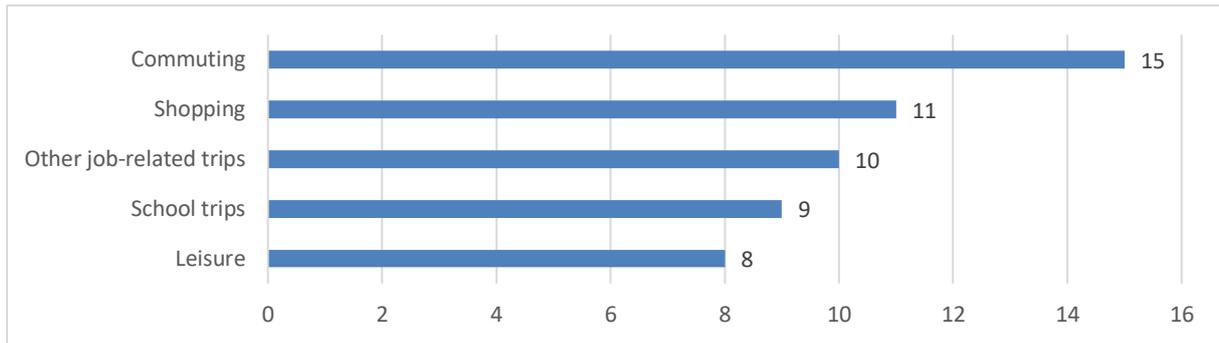


Figure 6: Potential trips that people will make in Quito using the e-vehicles (N=19).

Other possible uses include intermodal transport and tourism.

In the transport of goods, stakeholders expected that e-vehicles may be used most by medium or small private companies (15/19), followed by shops (14/19) and other entrepreneurs (13/19), in Figure 7.

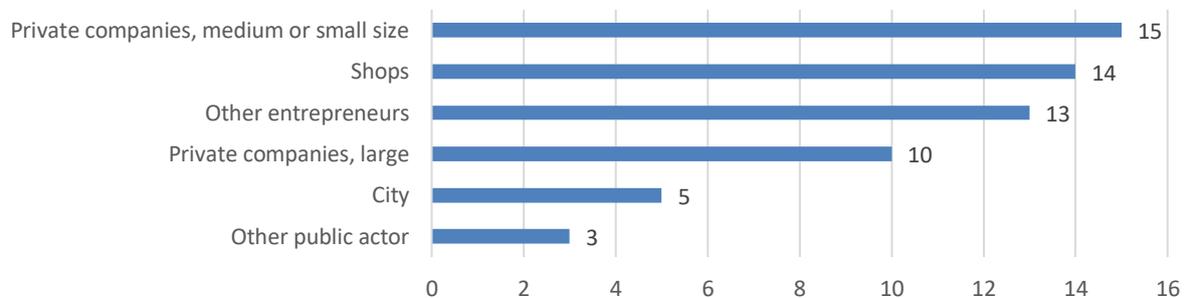


Figure 7: E-vehicles use for the transport of goods (N=19).

Based on the stakeholders' opinion, the main service operator for the e-vehicles should be a private service operator (15/19), (Figure C in the Appendix). Besides, Quito's stakeholders identified the following e-vehicle operators:

- Private industry or private company (to be selected under a call to allocate this service provider);
- Private companies through vehicle leasing, to enable continuous replacement of units due to the transition of electromobility;
- Private companies that could provide the service of transporting goods or transference to areas of difficult access;
- Company with the capability to invest in order to provide the service;- - Manufactures;
- Providers of mobility solutions/logistics/ bike courier services;
- Public-private alliance as a service provider (with the ability to provide standard quality service);
- Mixed provider/ private provider supervised by the municipality;
- And a system where the public subsidizes a part of the costs, or where it is granted to the private operator(s).

2.3 Obstacles, limitations and barriers

For the assessment of online survey questions related to the obstacles, limitations and barriers linked to the e-vehicles implementation, the results are presented based on the counts for each multiple-choice question option (item 19, Subsection 2.3.1) and stakeholders feedback reported in the open questions (items 20 and 21, Subsections 2.3.2 and 2.3.3, respectively).

2.3.1 Most challenging

The top three challenges for the successful implementation of e-vehicles are: lack of money / financial resources (15/19), lack of enabling policies (13/19) and investments needed (11/19), as shown in Figure 8. Other barriers include missing knowledge of the geographical area and socio and economic components.

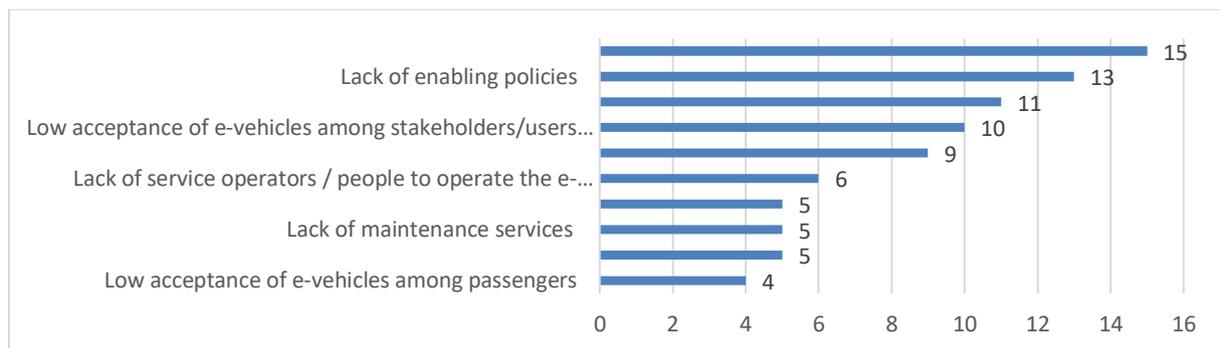


Figure 8: Most challenging for the successful implementation of e-vehicles (N=19).

2.3.2 Regulatory barriers

For the regulatory barriers that currently hinder the implementation, the stakeholders identified several factors and as listed below.

- Absence of specific homologation process for subcategory L electric vehicles (motorcycles, tricycles and quadricycles), which can generate delays in the registration process and circulation permits.
- Urban Planning documents of the Municipality need to be reviewed and harmonized so that all documents are aligned to the Metropolitan Development and Territorial Organization Plan (PMDOT) goals and identify the same intervention areas. More specifically, ordinances revolving heritage issues (i.e. Ordinance No. 260).
- In the same way, the Plan for the Special Tourist Zone of the CHQ should be reviewed or repealed, in conjunction with Quito Tourism so that planning does not encounter different intervention polygons in each of the planning instruments. All planning must be aligned with that proposed in the PMDOT.
- There are no clear regulations or policies on the matter at the local level.
- Availability of information and data to generate regulation.
- Regulations on the classification of light vehicles do not yet exist. It needs to be created as soon as possible for the implementation of the project.
- Lack of clear policies, because currently, CHQ is giving priority to only one type of vehicle (bicycle). The other CHQ users are left out. Ordinances that facilitate the operation of the proposed electric vehicles are lacking.

- No specific policies for the approval of electric vehicles, as well as specific regulations for logistics within the historic center.
- It should be checked whether there are appropriate regulations that motivate incentives for the purchase of electric vehicles such as tax exemptions, traffic preferences, among others.

2.3.3 Other barriers

Other barriers that may exist (e.g. institutionally) that can also hinder the implementation, were identified by the stakeholders as listed below.

- Possible opposition to the pilot from groups of merchants to the Municipality, who previously claimed for the pedestrianization of the Historic Center.
- The Metropolitan Institute of Heritage as executing entity of the interventions in the CHQ and based on its expertise, must know, contribute and suggest, observations in the different design, intervention and planning projects that are carried out in the patrimonial nature polygons with a joint work within the municipality (where all the entities necessary according to the process are summoned) and always aligned with the main planning of the Metropolitan District of Quito, such as the PMDOT.
- The community in this territory is very varied and has a great power of convocation and political power that has been maintained for years but in the same way, it has a fragmentation in representation, which can be felt in the conformation of neighborhood assemblies (there are 3 assemblies formed in the San Marcos neighborhood, for example), so it is suggested to work very hard on the part of citizen participation in parallel with the approval, since if this support does not exist it is very likely that any project will not be achieved;
- It is important to concatenate the processes that have been carried out previously in the case of the CHQ, the information and proposal made by the IMP with the support of the IMPU and the Central District Administration, who in 2018 and 2019 worked in the Partial Plan for the Comprehensive Development of the Historic Center of Quito, from which information of a social nature can be obtained sent through the Multipurpose Survey that was carried out at the end of 2017 to two thousand households that inhabit the heritage polygon of the historic center and its buffer zone.
- Insufficient knowledge of the subject: Likewise about the benefits to health and the environment that this type of mobility alternative could bring in the city.
- Infrastructure challenges in the CHQ;
- Dependence on the will of senior managers when not institutionalized in policies and programs.
- Need to review local regulations of the Municipality to ensure that everything can be carried out.
- Lack of definition of technical specifications on the part of the Passenger Company, and alignment with the Municipality. “Neither does the operating model.”
- Divergence in objectives in the various municipal entities involved.
- Acquisition due to high initial cost.
- Public acceptance by local citizens.
- Political support for the implementation of all elements of the project.
- At the user level, there is the need to communicate in such a way as to control anxiety due to the potential risk of running out of charge.
- Lack of suppliers and infrastructure that allows charging anywhere in the city. Potential hesitation from the unions of the transport operators that might not embrace the shift toward e-vehicles since by tradition buses have always been diesel fueled.

3 Results – Interviews

In the case of Quito, 10 interviews were conducted aiming to grasp the perspective of all stakeholders. From the local authority 4 interviewees were chosen, given the interdisciplinary approach the demo action entails. From an operating perspective, one public transport company and one service provided were considered. From the industry side, one Start-up working already on e-mobility was selected as was a charging infrastructure company, ABB Ecuador. From the demand side, a local association that represents several commercial establishments of the intervention area in the Historic Centre of Quito was included. Finally, a Logistics and Productivity Research Institute provided the perspective from academia. The institutions that were interviewed and representing the different stakeholders groups are identified in Table 1.

3.1. Aims of the city and Expectations of Stakeholders

All interviewees were asked regarding the reasons to get involved in an e-mobility project such as SOLUTIONSplus and most of them pointed out the environmental aspects as a key reason, although specific details varied from climate goals, to the need to address pollution and to improve the quality of life and preservation of heritage. Only the Metropolitan Public Transportation Company (EPMPTQ) and ABB Ecuador mentioned the unavoidable transition to e-mobility. Moreover, the Association called Historic Centred Buró (HCB) raised the importance of studies on the implementation of e-mobility with a citizen-centred approach. And CATENA mentioned the opportunity e-mobility provides for urban logistic solutions.

Complementarily, the main issues they identify that could be addressed through e-mobility revolved around pollution, noise, congestion and quality of life in the zone. Interestingly, CATENA sees a strong linkage between efficient urban logistics and good quality of urban life.

On the other hand, both the Territory, Habitat and Housing Secretariat (STHV) and service provider Bixi Cargo Ecuador expect the project to contribute to balance the participation of alternative modes of mobility and diminish dependence on private-fossil-fuelled vehicles and poor coexistence between modes. Furthermore, Bixi Cargo Ecuador identifies the opportunity to trigger a cultural shift.

Even though all stakeholders mentioned not having previous experience in projects like SOLUTIONSplus, some of them talked about previous experience either on sustainability projects, as mentioned by Territory, Habitat and Housing Secretariat (STHV) or on e-mobility itself, like the Metropolitan Public Transportation Company (EPMPTQ) operating the trolleybus or like SIDERTECH with the design and assembly of their e-scooter ERIDE.

Regarding the potential for scaling-up, all stakeholders agree the potential for replication of similar multimodal e-mobility hubs in other places of the city. The Environment Secretariat specifically mentioned other zones: Iñaquito, El Batán, República del Salvador, Tribuna del Sur, El Recreo. SIDERTECH also pointed out the area around República del Salvador as appropriate for replication, but also suggested other cities such as Ibarra, Cuenca, Manta. Contrastingly, the Metropolitan Public Transportation Company (EPMPTQ) suggested replication could be in areas where currently there is no coverage by public transport.

3.2. Implementation

Regarding implementation of the SOLUTIONSplus demos and how vehicles should be used, all stakeholders emphasize the need to have a design customized for the characteristics of the Historic Centre of Quito and of ensuring quality and good performance given the topography. Additionally, the Central District Administration (CDA) highlights that technical specifications must meet users' need for each use case, which complements the argument presented by SIDERTECH that vehicles should be of ensured quality and performance to make sure the user doesn't get discouraged with the idea of using EVs.

Also, Bixi Cargo Ecuador and the Historic Centre Buró stress the importance of having EVs specifically designed for freight trips and about that ABB Ecuador argues these should comply with international standards of freight vehicles. Complementarily, CATENA states the importance of the design alignment with the operational-logistics plan designed for the intervention area.

Some of the characteristics mentioned by stakeholders overlap with their concerns regarding the EVs such as performance and quality for the topography of the HCQ and the application of international standards. However, the prevention (especially of small parts) is raised as a main concern for various actors as well.

Another concern mentioned by the Central District Administration (CDA) is to find key locations where to distribute the EVs to ensure appropriate use and efficiency of service. Furthermore, the Territory, Habitat and Housing Secretariat expressed its concern on the fact there is no culture of respect to different modes of mobility (pedestrians, bicycles and cars) which might be a serious problem given EVs don't cause noise, as it was also highlighted by SIDERTECH.

User perception is also a concern for SIDERTECH since they think people see EVs as leisure vehicles which discourage the potential as a transport mode. However, the Environment Secretariat, ABB Ecuador and the Central District Administration (CDA) believe there is a generalized lack of knowledge regarding EVs, especially among citizens. In this regard, CATENA argues that even though there might be a lack of awareness of the EVs per se, some actors are open to new solutions for logistics in the pedestrianized zone. This argument is corroborated by SIDERTECH and the Environmental Secretariat who said delivery and courier companies have great expectations regarding the potential of EVs.

3.3. Regulation

According to the stakeholders, the most concerning regulation issue around light EVs revolves around vehicle categorization and labelling. As mentioned by the Metropolitan Public Transportation Company (EPMPTQ), currently some light EVs do not require homologation and for other 2 and 3-wheeled vehicles, varying on size and weight, regulation is not clear. This discourages local design and assembly of EVs due to the potential risk of not complying with homologation norms, and therefore not being able to commercialize the vehicles, as argued by SIDERTECH. Another relevant issue is the lack of safety and speed regulation for different types of vehicles, in order to ensure control, proper use of public space and safe coexistence between transport modes, as pointed out by the Territory, Habitat and Housing Secretariat and Bixi Cargo Ecuador. In a broader sense, several interviewees identified also the lack of incentives both to produce and import parts and CBU CKD; and for the renewal of fleet as barriers.

Finally, the regulation regarding electricity tariff was also identified as an issue. ABB Ecuador recognizes there is a regulation regarding tariffs, but only one and the Metropolitan Public Transportation Company (EPMPTQ) says regulation on tariffs for energy purchase for final users, and detailed regulation of the Energy Efficiency Law are missing. ABB Ecuador complements that regulation for adopting international standards available, especially for charging, is also needed.

3.4. Obstacles, limitations, barriers

For successful implementation, ABB Ecuador, SIDERTECH and the Metropolitan Public Transportation Company (EPMPTQ) emphasized the need for detailed planning of the pilot to make sure it covers all necessary operational aspects and, more importantly, that it includes the perspective and needs of all relevant stakeholders in the area of intervention. On the other hand, the Environmental and the Mobility Secretariats and the Central District Administration pointed out the testing phase as the most critical one. Complementarily, Bixi Cargo Ecuador and the Territory, Habitat and Housing Secretariat specified the safety and security issues that may arise once the EVs start circulating.

In such context, they all suggested early socialization of the solutions planned and the collaborative process for prototyping of the EVs and defining the logistic plan. The Environmental Secretariat mentioned is key to have clear objectives for the intervention and the Mobility Secretariat said it is crucial to start planning operational aspects such as routes as soon as possible, while the Territory Habitat and Housing Secretariat considers it will be necessary to evaluate the accessibility of vehicles to certain zones inside the Historic Centre with EMMOP (Public works Company) and to harmonize pedestrian zones with bicycle zones with right signs before testing.

3.5. Sustainability of the e-Mobility solutions to be implemented

Most stakeholders agreed that e-mobility solutions will improve urban mobility by providing new solutions and improving environmental conditions. Nevertheless, the Metropolitan Public Transportation Company (EPMPTQ) thinks that would only happen if e-solutions come accompanied with control from the authority, matching the Low Emission Ordinance with the EVs adoption, so that it becomes a shift towards e-mobility and not only concurrency with fuel vehicles.

In order to ensure the sustainability of the solutions implemented, interviewees acknowledge mostly the potential positive impacts the pilot can trigger. The Mobility Secretariat, ABB Ecuador and the Metropolitan Public Transportation Company (EPMPTQ) think e-mobility will contribute to job creation, while SIDERTECH and Bixi Cargo Ecuador speak of rather a shift towards more specialized jobs, new business models and the emergence of an industry of alternative mobility.

Another social impact expected is improved quality of life through accessibility and safety, as mentioned by the Central District Administration (CDA); and less air pollution and noise, as mentioned by CATENA. The latter also mentioned public awareness and increased education as another positive effect, which complements the idea of Bixi Cargo Ecuador that new debates around mobility and social differences will come which combined with the creation of local capacities are wide use of e-bikes, might even create a new sense of identity for the Andean cities.

On the other side, interviewees believe the potential negative impacts identified can be mostly mitigated early in the implementation of the demo or maybe addressed with proper integral transport planning by the Municipality. For instance, the potential hired trips reduction for informal transport drivers operating in the HCQ, mentioned by CATENA, or the risk that fossil-fueled vehicle services may be shifted to other zones of the city (usually lower income zones or places where they can operate informally), mentioned by the Metropolitan Public Transportation Company (EPMPTQ), can both be addressed by involving these groups in the project and enabling an opportunity to renew their fleet or innovate in their service to continue operation in the same HCQ.

Likewise, the risks of too many EVs creating congestion, as foreseen by the Central District Administration; or the idea that there might be a limited number of users, limited accessibility and too many restrictions in the HCQ, as considered by the Historic Centred Buró (HCB); and the fact that prices

could increase because of different operational and charging costs for e-vehicles, as mentioned by ABB Ecuador; are issues that can be controlled by proper transport planning.

3.6. Impact on existing business models

Most actors interviewed think there is potential to innovate business models. The Environmental Secretariat thinks this an opportunity to formalize current informal services and provide better transport service for users, and the Mobility Secretariat agrees saying organization and costs can be improved. The Central District Administration approves that Transport and freight of good provision will face a lot of change, especially in markets. Likewise, Bixi Cargo Ecuador believes customers and merchandisers could have better transportation opportunities and that transportation unions could adapt new models and vehicles.

On the other side, The Metropolitan Public Transportation Company (EPMPTQ) thinks good provision for commercial establishments in the HCQ won't change much but freight trip services might change if there is a distribution centre. Opposingly, CATENA thinks commercial establishments will have to adapt to good provision planning needed for the logistics operational model planned for the HCQ, which therefore will in fact change their supply chains.

3.7. Implications for Planning and Urban Development

Most actors were asked about the implications of e-mobility in transport planning. In that regard, the Territory, Habitat and Housing Secretariat (STHV) and the Historic Centred Buró (HCB) think the main implication will be an increase in the quality of transport. The Central District Administration thinks route planning will not face a major change, but that new infrastructure will be needed. In contrast, Bixi Cargo Ecuador thinks transport planning will be more complex and require more specialized professionals. ABB Ecuador agrees, specifying that considering charging time is crucial for route planning.

The Metropolitan Public Transportation Company (EPMPTQ) thinks the Municipality has the duty to increase transport coverage for the population, but formal routes don't reach the outskirts, so those areas are usually provided by informal services. In that sense, they think e-mobility is an opportunity to provide solutions for those areas private operators will not cover.

Regarding implications for overall urban development and urban planning, the Territory, Habitat and Housing Secretariat (STHV) thinks e-mobility needs to be integrated into Quito's urban planning vision, complementing the idea of the Mobility Secretariat that e-mobility will change planning on how to access places, while the Central District Administration (CDA) think e-mobility hubs might act as urban amenities.

Bixi Cargo Ecuador, on the other side, thinks that light EVs will provoke democratization of public space, but that new elements should be included in urban planning like space for non-motorized modes and facilities for parking and charging. Likewise, ABB Ecuador points out that enough space/parking lots for charging (e-buses, e-vehicles) need to be considered.

Finally, SIDERTECH argues that distance is the biggest limitation for e-mobility solutions, so they think a transition towards e-mobility would imply urban planning with focus on enhancing proximity and therefore higher density.

In terms of the electric network, the Mobility Secretariat considers the shift to e-mobility will take a toll on the energy network, which could create challenges for the energy provider (*Empresa Eléctrica Quito*). Bixi Cargo Ecuador also considers new investments will be needed, especially charging

infrastructure for bigger e-vehicles, something ABB Ecuador also details stating that a three-phase network should be available for e-buses and Biphasic network for smaller e-vehicles.

3.8. Contribution of SOLUTIONSplus to Long Term Goals

The last topic discussed with all stakeholders revolves around their own long-term goals in terms of e-mobility and how SOLUTIONSplus could contribute to them. About that, the Environment Secretariat mentions the Climate Goals as the overarching vision of the city and the Territory, Habitat and Housing Secretariat details that alternative mobility is part of the city's long-term vision. In such context, the Metropolitan Public Transportation Company (EPMPTQ) highlights that the newly approved ordinance on the integration of the transport system aims for e-mobility and therefore requires that in order to receive a share of the common cash collection, a company must comply with various e-mobility requirements. SOLUTIONSplus can contribute to the design and operation the company foresees for the LEZ in the HCQ and in the future contribute to access funding for further investments as well.

The Mobility Secretariat, on its side, thinks that the SOLUTIONSplus project will contribute in terms of communication and awareness around e-mobility and represents the first concrete step in the shift towards e-mobility, while the Territory, Habitat and Housing Secretariat thinks the project will also show to citizens how e-mobility operates in practice. In contrast, ABB Ecuador believes Quito might have a long-term vision, but not necessarily well defined. Thus, the SOLUTIONSplus project might help the Municipality realize what is missing.

The private sector stakeholders, on the other hand, think the SOLUTIONSplus project contributes to a shift in culture and in the vehicle market through information regarding user needs and city characteristics, as stated by SIDERTECH, and can therefore contribute to local capacity development and to the creation of multi-actor coalitions, as mentioned by Bixi Cargo Ecuador.

References

DLR and VTT. (2020). *SOLUTIONSplus User Needs Assessment: Guideline*.
https://drive.google.com/file/d/12F3_C5g0doKrdDYdzgLQKFHj1c8VLbqV/view

Appendix

Additional Figures

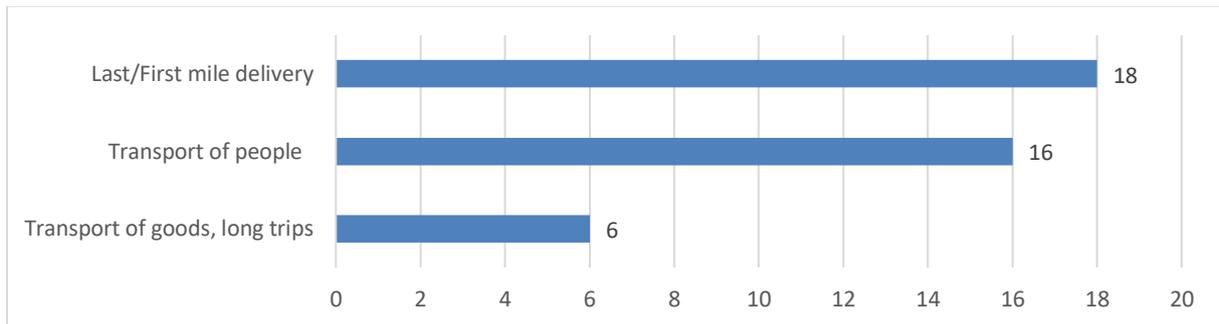


Figure A: Targeted use cases for e-vehicles (N=19).

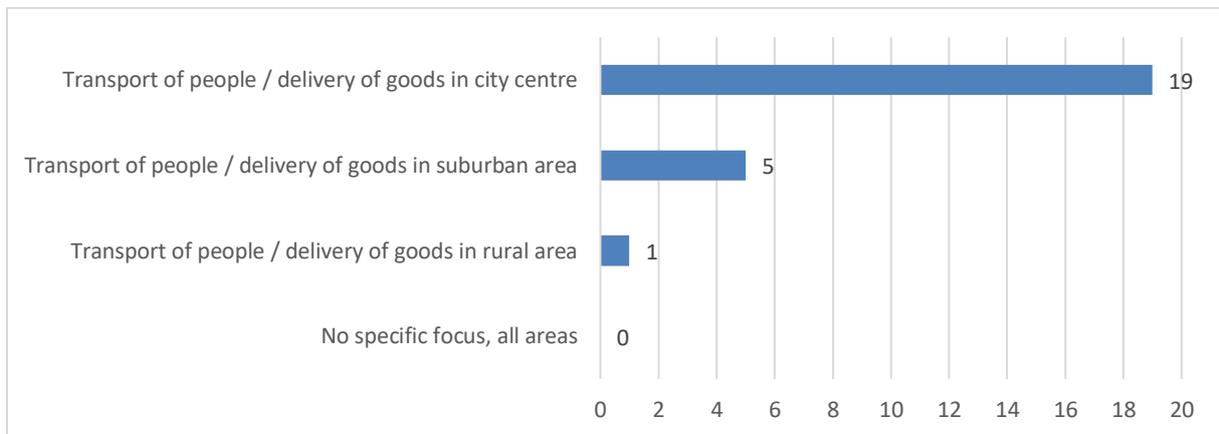
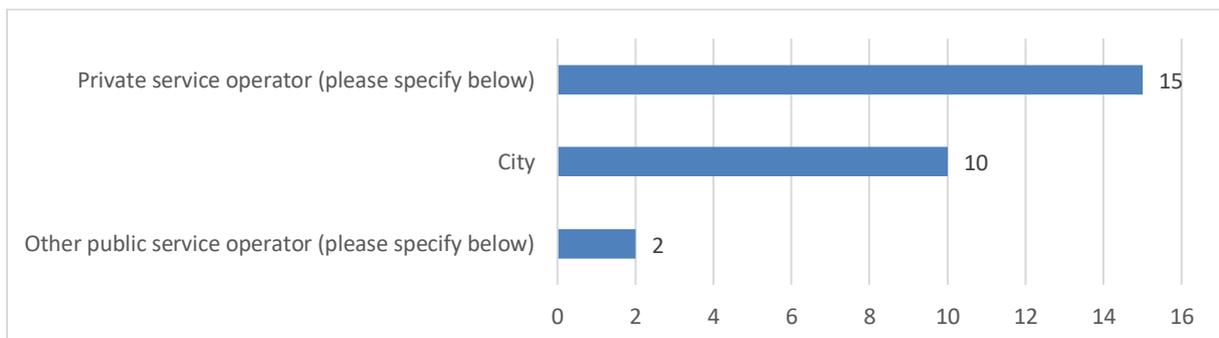


Figure B: Areas of the city/region where the e-vehicles are going to be used (N=19).



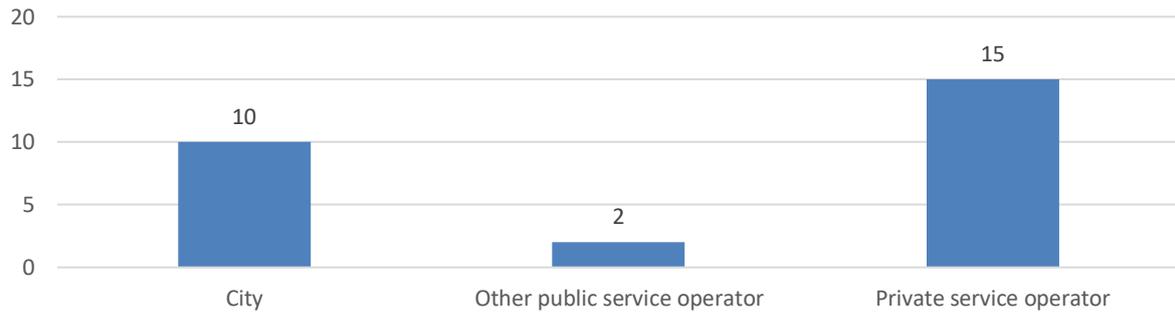


Figure C: Main service operator of the e-vehicles (N=19).