



**+Electric
vehicles
in the ride-hailing
industry**

 **IDB | Invest**

 **cabify**

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About IDB Invest

IDB Invest, a member of the Inter-American Development Bank (IDB) Group, is a multilateral development bank committed to promoting the economic development of its member countries in Latin America and the Caribbean through the private sector. IDB Invest finances sustainable enterprises and projects to achieve financial results that maximize economic, social and environmental development for the region. With a portfolio of assets of \$12.4 billion under management and 342 clients in 24 countries, IDB Invest works across sectors to provide innovative financial solutions and advisory services that meet the needs of its clients.

About Cabify

Cabify, a signatory member of the UN Global Compact since 2018, connects private users and companies with the means of transport that best suit their needs. Its main objective is to make cities a better place to live. For this, it seeks to decongest the streets by providing, through technology, a safe and quality transport option.

Founded in 2011, in Madrid, Cabify extended, a few months later, to Latin America and is currently present in Argentina, Brazil, Chile, Colombia, Ecuador, Spain, Mexico, Panama, Peru, Uruguay and the Dominican Republic. Cabify adapts to the particularities of the almost 100 cities in which it operates. With an almost entirely Latino team, it stands out for betting on local talent, generating jobs in an industry that is being transformed by technology. Cabify, as part of its commitment to be a socially responsible company and in line with the SDGs, is the first MaaS in Latin America and Europe to offset 100% of the CO2 emissions generated by its operation.

About Ernst & Young

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In 2018 we became the first and only mobility company to be 100% carbon neutral in Europe and Latin America. We know that our greatest potential impact does not lie in compensating but in mitigating our carbon footprint. This is why we want to take our environmental commitment one step further, which means reducing the impact in all our offices and making electric vehicles available to our drivers.

Our commitment to electrification has a clear target: to have a 100% electric fleet in the next five years. In the meantime, we will work to introduce a growing number of electric vehicles onto our platform. These efforts will enable us to offer cleaner transportation options to our users and drivers. And, the more vehicles we add, the closer we will be to realising our mission to make our cities better places to live.

This initiative is part of the Mobility as a Service platform we are building, in which we offer transportation options such as scooters or electric motorcycles, in addition to ride-hailing. We work at the forefront of sustainability to provide a larger number of alternatives for cleaner mobility and, ultimately, to create a better future for the communities where we operate.

Juan de Antonio Rubio

CEO and Founder, Cabify.

Latin America and the Caribbean is the most highly urbanized region in the world. Its population faces extraordinary traffic congestion and urban mobility challenges. The transportation sector in the region is a major contributor (approximately 34%¹) to global greenhouse gas emissions (CO₂).

Shared-mobility platforms that connect technology with transportation are an alternative to traditional mobility because they offer flexible transportation services. However, it is urgent that this type of platform and the transportation sector at large incorporate electric vehicles as a solution that favors decarbonization, since they are less polluting than internal combustion vehicles. Ultimately, this step contributes to climate change mitigation.

Cabify shows its commitment to sustainability by drawing up a plan to increase its electric vehicle fleet, which includes financial technology (fintech) platforms as a vital tool for implementing mobility platforms.

IDB Invest fosters these kinds of transformational projects that have an impact on the economy, the environment and society. This collaboration also gives us the opportunity to support a cutting-edge, digital business model that is transforming the urban transportation sector and; at the same time, contributes to an agenda that promotes clean and smart cities; improves the life of citizens; and reduces the time and cost of transportation.

Guillermo Mulville

Head of Telecommunications, Media and Technology, IDB Invest.

¹World Resources Institute, 2015.

Introduction

In the last decade, the development of new business models in the collaborative economy has experienced exponential growth in sectors such as hospitality, office rental, finance, health or private transportation.

Mobility is one of the industries that has gained greater momentum in the world, especially in Latin America and the Caribbean. This is mainly due to the boom of transportation service platforms that use private vehicles, known as ride-hailing, which connect users with private vehicle drivers to move around the city.

The ride-hailing market amounts to US\$60 billion and will reach US\$285 billion worldwide by 2030², with an annual growth rate of 14%. Latin America and the Caribbean is one of the key regions for this market, as it is the most highly urbanized region in the world³, in addition to recording a high margin of opportunity with regard to mobile broadband penetration.

Due to the entry of ride-hailing as a transportation alternative, it is essential to reduce vehicular emissions to help decarbonize Latin America and the Caribbean. For that purpose, incorporating zero-emission autonomous and electric vehicle fleets must overcome some external barriers to the industry, such as the availability of electric vehicles, the infrastructure of cities and the generation of clean energy.

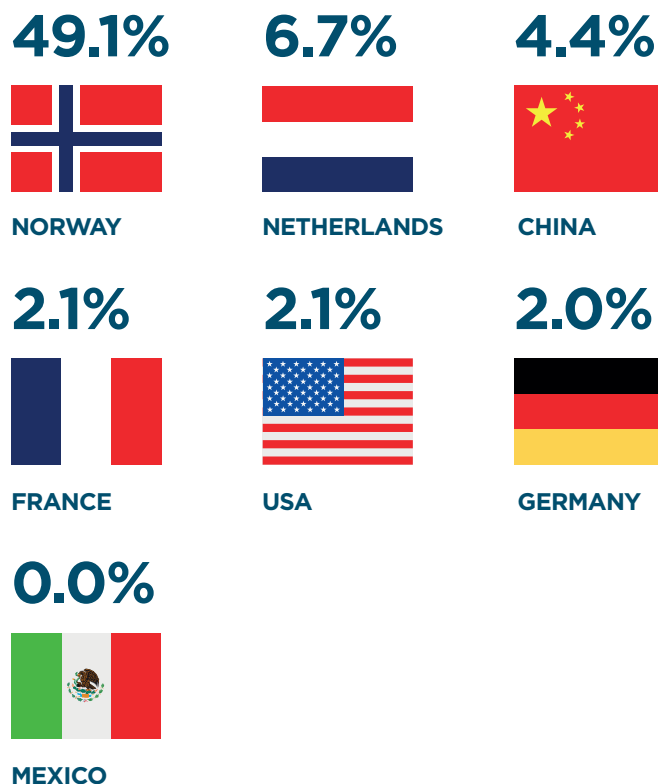
“+ Electric vehicles for the ride-hailing industry” analyzes the general dynamics of this sector and identifies sustainable business models, including finance technologies, such as fintech companies (fintechs), to accelerate the transition to electro-mobility. This report is based on an analysis conducted in Mexico, whose lessons can extend to the whole region.

² Burgstaller, Flowers, Tamberrino, Terry and Yang, 2017. ³ World Bank, 2014.

Current situation and challenges of the electric vehicle market in Mexico

The Mexican market for electric vehicles (EVs) is still in its infancy.

In 2018 only 0.01% (approximately 201 vehicles) of new vehicle sales accounted for electric models⁴, unlike Norway, the global leader with 49%.



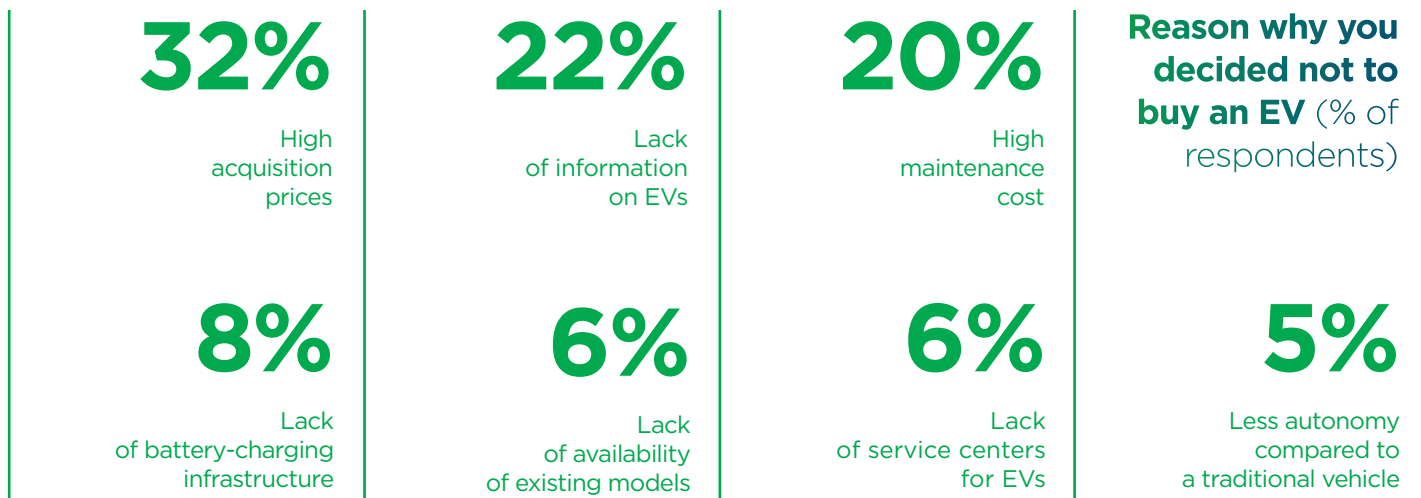
Proportion of EVs in the total sales by country in 2018

Source: Statista - Electric Vehicle Registrations as a Share of Total in Selected Countries Worldwide in 2018.

⁴ National Institute of Statistics and Geography (INEGI), 2019.

EVs represent an almost non-existent proportion of the automotive fleet in the taxi and ride-hailing service industry. It is estimated that the government's support program for the replacement of taxis with hybrid or electric vehicles in Mexico City resulted in approximately 350 loans, with a minimal percentage for EVs⁵. Currently, Cabify's fleet in Mexico has hybrid vehicles, but not EVs.

According to a sample of drivers that use Cabify, the main challenges for the integration of EVs into the ride-hailing sector include:



Source - Focus group surveys on 234 active drivers in Cabify's fleet between March and April 2019. Ernst & Young.

PRICE	LACK OF INFORMATION	LACK OF CHARGING INFRASTRUCTURE	LACK OF AVAILABILITY
The main barrier reported by more than 50% of the drivers. Most of them refer to the acquisition, but high maintenance prices are also perceived.	This challenge justifies a coordinated effort of various industry players (the platforms, the government and the manufacturers) so that the population and the drivers gain a better understanding of EVs.	Measures are underway to implement electro-mobility infrastructure in the medium-term. Nevertheless, currently there are only 500 private charging points in Mexico compared to the over 45,000 points in the USA ⁶ .	Ten models of EVs are presently traded in Mexico, compared to over three hundred of internal combustion vehicles (ICVs). Besides, only four of the existing models are deemed suitable for ride-hailing drivers due to their price or features.

⁵ Mendoza and Martínez 2018, Xataka, 2019. ⁶ Electromaps, 2019.

Models and features of EVs available in the mexican market

EVs included to evaluate the potential for ride-hailing.

BRAND	BMW	CHEVROLET	NISSAN	TESLA	RENAULT
MODEL	i3	Bolt EV	Leaf	Model 3	Twizy
SIZE	Subcompact	Subcompact	Compact	Compact	Minicompact
BASE PRICE (MXN '000)	879.9	806.3	696.5	937.0	319.3
PERFORMANCE /100KM	14.3	17.6	16.5	14.9	NA
POWER (KW)	135	149	110	192	14
AUTONOMY (KM)	300	383	240	335	100
BATTERY (KWH)	42.2	60	40	50	6.1

BRAND	ZACUA	TESLA	TESLA	JAGUAR	KIRI
MODEL	MX2/3	Model S	Model X	I-Pace	Seed
SIZE	Compact	Full size	SUV	SUV	SUV
BASE PRICE (MXN '000)	569.0	1,740	2,032.9	2,060.4	310.0
PERFORMANCE /100KM	NA	19.00	21.10	22.30	NA
POWER (KW)	34	311	311	294	14
AUTONOMY (KM)	160	500	475	415 - 470	150 - 160
BATTERY (KWH)	18	95	100	90	NA

Source - webpages of manufacturers of the included vehicles and informational interviews.
 Values obtained under controlled conditions that may not be reproducible in conventional driving situations.

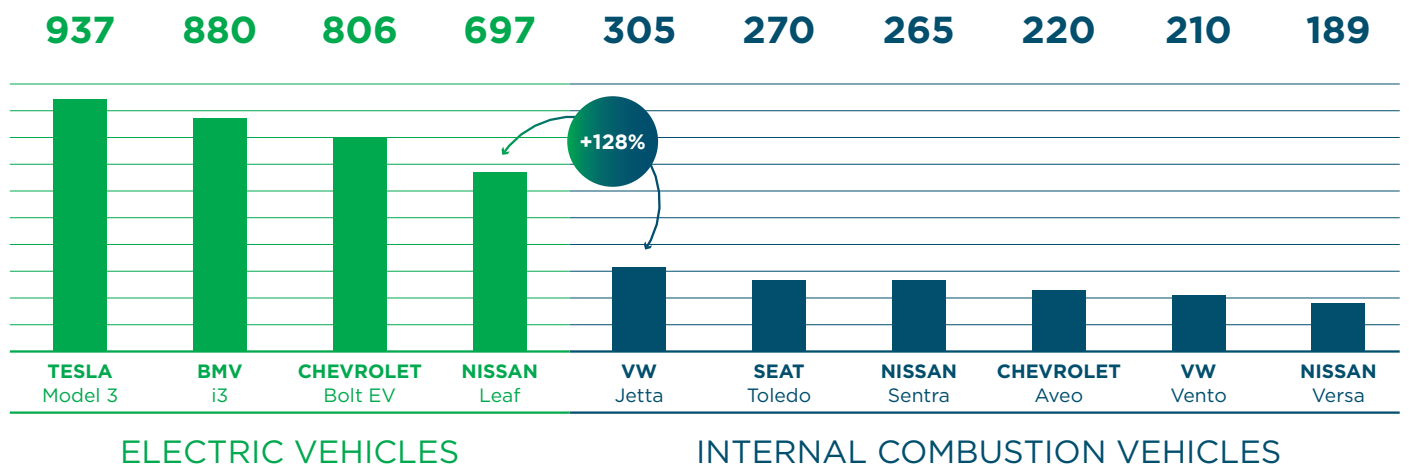
Total cost of ownership of electric and traditional vehicles

Current estimates are that approximately 33% of the cost of an EV corresponds to manufacturing the battery, presenting an essential challenge for its widespread use.

The technological and regulatory progress in the short- and medium-term are expected to cause an annual 4% reduction in the cost of the battery between 2015 and 2025⁷, which would increase the general public's access to this type of vehicle.

Despite this progress, current acquisition prices of an EV in Mexico are notably higher than those of the most common ICVs in Cabify's fleet.

Base acquisition price of vehicles
(MXN '000)



Source: webpages of manufacturers of the included vehicles.

⁷ Bloomberg, 2019.

To clarify the difference between the acquisition and operation cost of an EV versus an ICV, it is necessary to consider the total cost of ownership (TCO) that includes all costs associated with both vehicles during their lifecycle.

The TCO includes three types of costs:



ACQUISITION COST

Initial investment (down payment), financing cost (monthly installments and interest) and taxes.



OWNERSHIP COST

Verification, possession and insurance.



OPERATION COST

Gasoline or electricity, corrective and preventive maintenance, tire changes throughout a specific period.

In general, the ownership and operation costs of EVs are lower than those of ICVs. For example, in 2019, the average charging cost per kilometer of the analyzed EVs was US\$0.01, compared to the average cost of fuel per kilometer, US\$0.06, of the ICVs^{8,9}.

Nevertheless, although these figures reduce the difference with the ICVs in terms of total cost, EVs' ownership and operation costs do not offset the difference in the acquisition cost.

⁸ Global Petrol Prices, 2019. ⁹ The average price per liter of gasoline in Mexico between January and May 2019 was used to calculate the cost of fuel. The technical specifications provided by manufacturers of the ICVs included in the study were also taken into account.

Currently, people who buy EVs (or hybrid vehicles) are exempted from paying:



Taxes on new automobiles (ISAN, in Spanish)



Possession



Biannual Verification

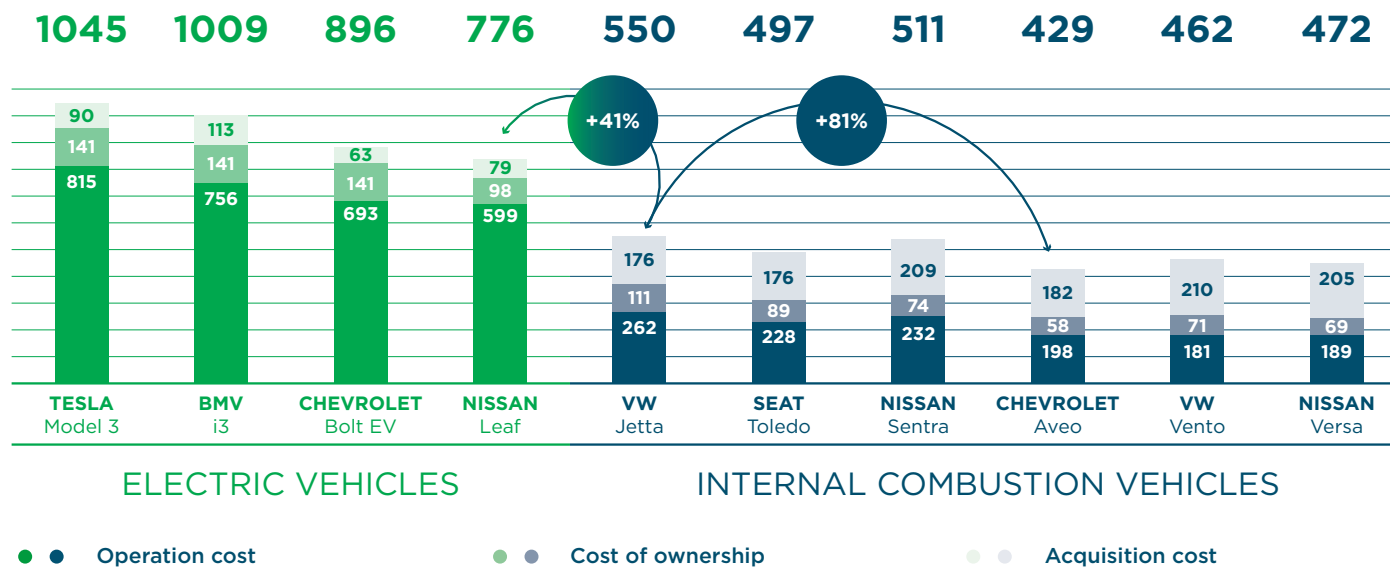
Current tax incentives for EVs

Source: Federal District Mobility Law.

Nowadays, the most affordable and available EVs are 41% and 81% more expensive than the most common models of Cabify's fleet.

Due to the reduced range of existing EVs in this market, elements such as tires and insurance with comprehensive coverage increase the TCO.

Total cost of ownership (TCO) by model (MXN '000)



The introduction of EV models with a low acquisition cost in the short- to medium-term could influence the prices of the models available in the market.

The potential market for drivers and ride-hailing

The necessary economic conditions, in accordance with available models, were analyzed to understand the potential market for the incorporation of EVs by drivers working with Cabify.

- Currently, the Nissan Leaf is the most affordable vehicle available. A monthly installment of US\$825, upon down payment, has been estimated.
- According to previous studies, a driver can allocate up to 33% of his/her net income¹⁰ to pay his/her car loan. Those studies consider that the operating savings of EVs allow increasing that percentage up to 40%¹¹.
- Under these assumptions, the monthly net income of a driver to acquire the most affordable vehicle of this EV category should be higher than US\$2,020.

¹⁰ Datum provided by financial institutions during informational interviews held with EY.

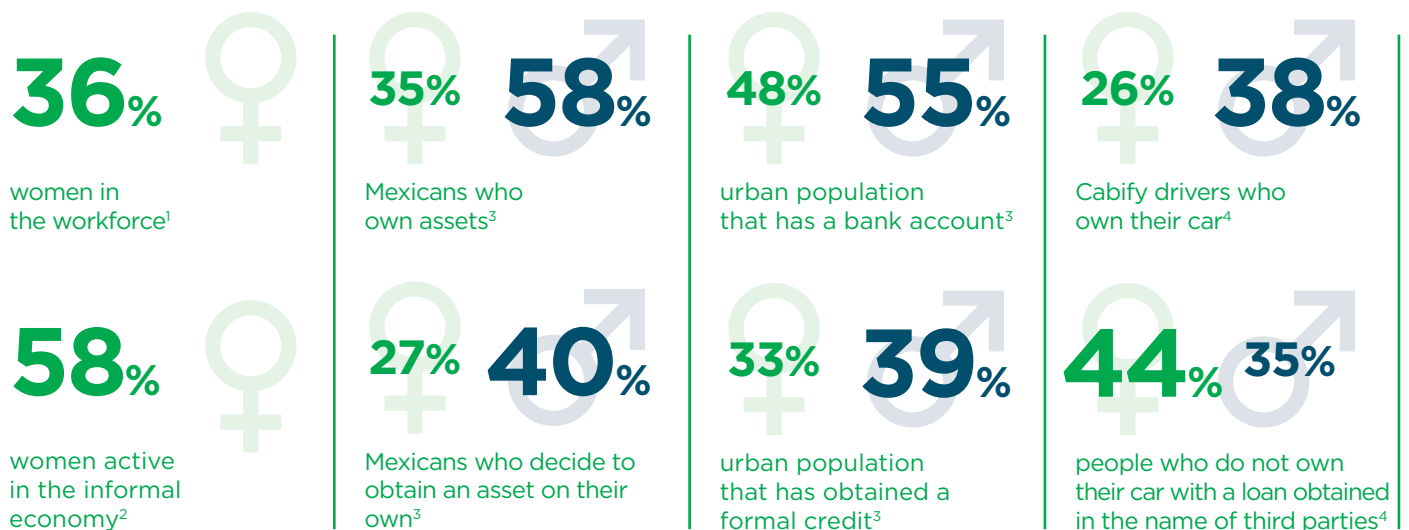
¹¹ According to the difference in operation and ownership costs between EVs and ICVs identified using as a basis the tax benefits and operating savings of the former over the latter. This results in the allocation of a higher percentage of income to the purchase of an EV. EY.

In 2018 the average salary of employees working in the formal sector who are enrolled in the Mexican Social Security Institute (IMSS) was US\$ 554. Although some ride-hailing drivers obtain a higher income, it is lower than the amount required to buy an EV. These figures show the existing gap to gain access to an EV and evidence of the difficulties in achieving the widespread incorporation of private EVs.

One of the benefits of ride-hailing is the possibility of offering access to the labor market and equal opportunities to groups that have fewer opportunities, such as women.

Nevertheless, female drivers face more significant challenges to buy an EV due to the multiple economic barriers that continue to exist for their full participation in the workforce and in the ride-hailing sector.

Characterization of female economy and assets in Mexico



Sources: 1) World Bank, ILO - 2018, 2) World Bank - ILO 2017, 3) National Institute of Statistics and Geography (INEGI), National Survey on Financial Inclusion, 2018, figures for cities or more than 15,000 inhabitants 4) EY's survey on active drivers in Cabify's fleet.

¹² IMSS, 2018.

Looking ahead

Beyond credit lines generally offered by banks, the financing alternatives must provide specific solutions leveraged on the business model of ride-hailing companies.

Fintech platforms (financial product applications) can include variables to activate and increase the use of EVs. Fintechs can offer products to drivers who do not have accounts in banks and face problems gaining access to loans from traditional sources. These platforms are more agile and offer innovative and customized products. Lana is a fintech that provides specific financial products for the acquisition of EVs, among other services.

Variables for financing alternatives

MODEL	SEGMENT	FINANCING PILARS	FINANCING SYSTEM	ROLE
NISSAN Leaf	All	Cabify's rates	Individual purchasing	Cabify
BMW i3	Corporate only	Cabify's fees	Fleet purchasing	Bank
TESLA Model 3	Consumption only	Assembly plant's discount	Leasing	Lessor/ Assembly plant
CHEVROLET Bolt		Tenor		Driver
OTHER		Interest rate		
		Fintech Platforms		

MODEL	SEGMENT	FINANCING PILLARS	FINANCING SYSTEM	ROLE
Vehicle model is selected consistent with its features and price, and based on the rollout of new models.	New product addressed to a particular client segment (e.g., corporate only), whose transportation characteristics can favor the incorporation of EVs.	This category includes variables directly addressed by Cabify, either independently or through a partnership with a third party, like a fintech, so that a driver can buy an EV.	This variable considers the vehicle financing alternatives in the market. Each of these alternatives has specific benefits that can be boosted in combination with other vertical variables of the reference framework.	The role that each key stakeholder group must play to incorporate EVs. It is determined in compliance with what has been defined in the first section of the model.

Multiple scenarios that would facilitate the incorporation of EVs in Cabify’s operation are identified using this framework as a basis. These scenarios take into account various types of support that the stakeholders could grant to the drivers:

-
1. Direct acquisition by drivers. Expanding the potential universe of drivers requires initiatives that increase their average income or higher subsidies from some stakeholders. An obstacle that must be taken into account is the large initial disbursement needed from a driver to cover the down payment, which amounts to nearly US\$7,160, under the most affordable financing systems currently available in the market.
-
2. Fleet purchasing. Cabify could consider the acquisition of a vehicle fleet to sublet the units to its top drivers for daily use. This scenario involves negotiations among the platform, the EV assembly plant, and possibly, a third party that can offer better financing conditions.

Although this system requires that Cabify makes a significant investment and absorbs the entire risk of this pilot program, it has the direct effect of increasing the number of drivers that could work with an EV.

This initiative could be adapted to a specific client segment, depending on the average rate and duration of the trip, to amortize the initial investment as efficiently as possible. Shared use of the vehicles could also be developed, by allocating them to more than one driver, to increase the productivity of the asset and distribute the risk between two or more drivers.

The risk that drivers prefer to participate in financing schemes to acquire new or semi-new ICVs must be considered.

-
- 3.** Full payout leasing system. This is about introducing an EV through a full payout leasing plan. The main benefit is that none of the involved parties must make an initial disbursement. There is also the possibility of deducting taxes, including maintenance expenses. However, it is necessary to take into account that the inherent tax benefit of this system is entirely dependent on the legal and tax environment of the country at that time. It is also necessary to consider that drivers may be inclined to purchase ICVs on their own.

A combination of the aforementioned elements and currently available financing systems could lead to achieving a financing proposal that helps integrate EVs into Cabify's fleet.

Similarly, it could be possible to leverage a diversity of systems and synergies among the key stakeholders and the financing pillars to overcome the obstacles that fleet electrification initiatives are currently facing.

Finally, new technologies and fintech platforms would allow for faster implementation of this initiative, by facilitating the payment of monthly installments and reducing the financing risk, both for banks and ride-hailing platforms.

Conclusions

The findings of this study state the following:

The initial acquisition cost of an EV is the main obstacle to affordability for drivers.

- The current reduced supply in the Mexican market limits the range of options available to the parties interested in an EV.
- In 2018 only 0.01% of new vehicle sales in Mexico corresponded to EVs.
- There is still a 40% difference between the TCO of an ICV over eight years and the currently most affordable EV in the Mexican market (the difference in the acquisition cost is 128%).

The lack of charging infrastructure and the limited information on EVs are additional barriers.

- Currently, there are only 500 private charging points in Mexico, compared to over 45,000 points in the USA.
- The lack of information on EVs was the second most frequent response after the high acquisition prices among the drivers who participated in the study.

Providing support to the drivers is vital to achieving the introduction of EVs into Cabify's fleet.

- Indirect subsidies resulting from a reduction in Cabify's take rate are an option.
- Alternatively, Cabify can make a significant investment to acquire a fleet and sublet the EVs to drivers who meet specific requirements.
- The design and implementation of a driver rotation system for the shared use of the vehicles could distribute the risk and payment responsibility, increasing the affordability level.

Decarbonization of economies is an urgent and necessary challenge. The integration of different technologies and solutions, such as EVs and fintechs, can allow overcoming structural obstacles.

Fintechs act as platforms to resolve the financing challenges of the acquisition cost and the limited information available to drivers. Data intelligence handled at ride-hailing companies makes fintechs' ideal partners to collect information and offer better financial products that overcome current market failures.

The technology provided by fintechs will help ride-hailing companies reduce the costs of managing financial products, compared to traditional banks. This results in lower costs for the drivers and more attractive terms that will allow the continued introduction of EVs into the market. The combination of technologies and new business models will give us the possibility of investing in initiatives that reverse the negative trends of climate change.

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Appendix: Methodology to analyze the total cost of ownership (TCO)

The TCO was calculated as follows¹³:

1. Cost identification: the following costs divided into three categories were taken into account:
 - Acquisition costs: initial investment, financing cost and taxes.
 - Costs of ownership: verification, possession and insurance.
 - Operation costs: cost of gasoline or electricity, corrective maintenance, preventive maintenance and tire change.
2. Calculation of present value of all one-time and recurrent costs over the next eight years:

- The present value of future one-time costs is calculated using the following equation:

$$PV = A_t \times \frac{1}{(1+r)^t}$$

- The present value of future recurrent costs is calculated using the following equation:

$$PV = A_0 \times \frac{(1+r)^t - 1}{r(1+r)^t}$$

Where: PV = Present value, A_t = Amount of one-time cost in t time, A_0 = Amount of recurrent cost, r = Discount rate, t = Time (expressed in number of years).

The assumptions defined for the model were obtained from interviews made to various financial institutions, vehicle assembly plants in Mexico and relevant institutions of the sector.

The introductory list price was considered for all the vehicles. If this price did not meet the lower limit of MXN200,000 (US\$10,445), imposed by Mexico City's mobility regulation, the next version that met that requirement was considered.

¹³ Lebeau, Lebeau, Macharis, & Van Mierlo, 2013.

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