iPodia – Innovation Team Project

Group 12

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Agenda

1. Global challenges and requirements
2. Survey results and classifictaion of requirements
3. Product concept and product variants
4. Management summary

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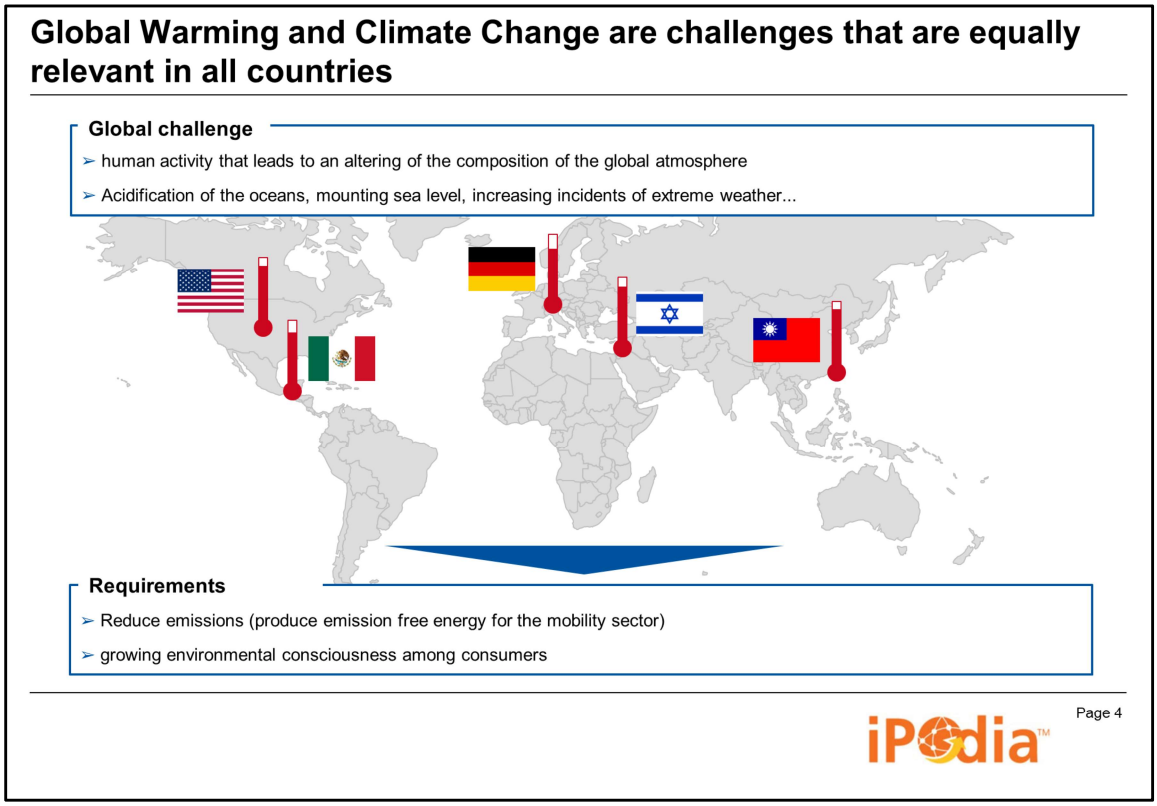
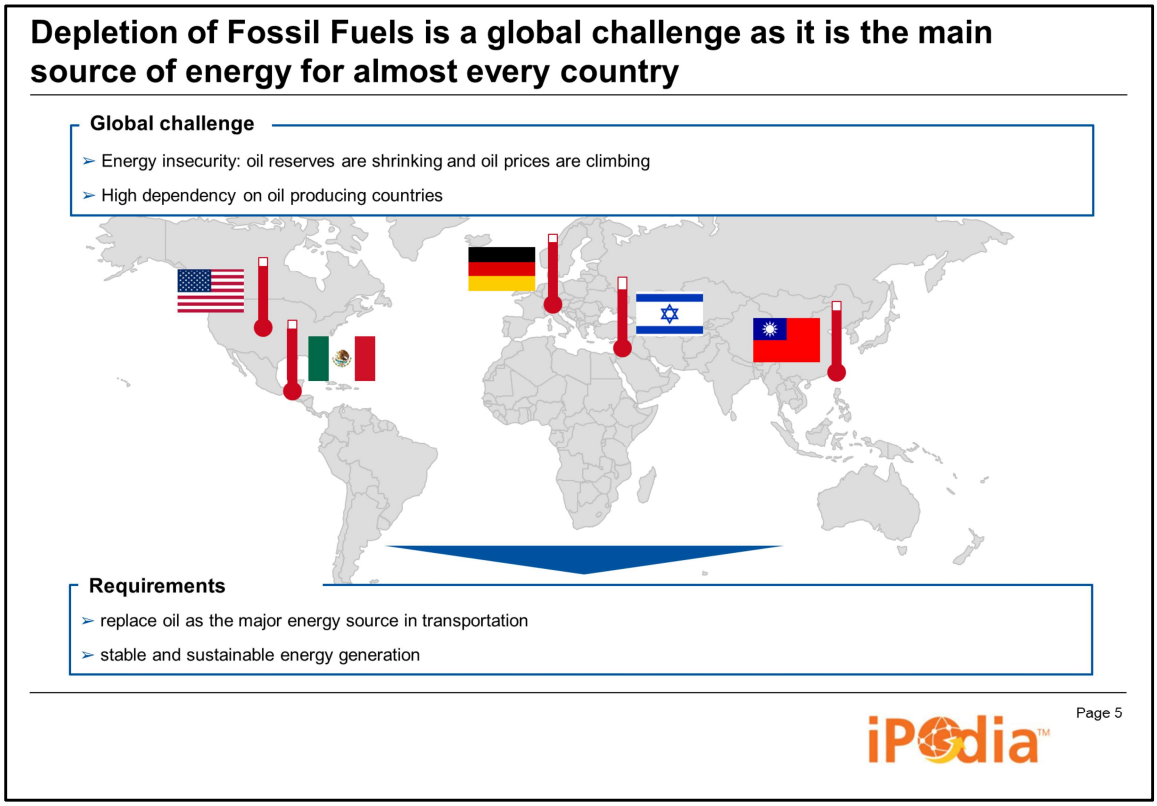


Germany is pioneering an energy transformation with the strategic goals to increase the share of renewable energies and reduce the emission of green house gases.[1] In 2015, the share of renewable sources in German domestic *power consumption* amounted to 31.6 percent; the goal is to achieve at least 80 percent by 2050. [1] Furthermore Germany wants to achieve 90% emission cuts for the car emission of CO2 from 221g CO2/km in 2005 to 20g CO2/km in 2050. [2] The country is showing a high awareness rate of more than 95% for the climate change. [3]
Taiwan is experiencing extreme climate change recent years, such as more violent typhoon [6] and intense precipitation. And the government sets goal to increase the share of renewable energy to 20 percent of total power by 2025.[7] Also, Taiwan has been investigating how to make use of the potential offshore wind power and marine energy. [8]
While Israel is a relatively small contributor to the global climate change due it's population and size, it is highly sensitive to the potential impacts of the phenomenon, due to its location. In April 2016 the Israeli cabinet has approved a national plan for the reduction of greenhouse gas (GHG) emissions. The main goal of the plan is implementing a reduction target of 26% below 2005 per capita emissions level.
The problem of global warming in Mexico, is just beginning to be an issue of importance due to the impact it has had on climate change and the health of the population. The establishment of foreign and national companies, mainly producing or manufacturing, has favored global warming. Mexico does not have the necessary governmental support to promote the development of green technologies.
Global warming has been a hot button issue in politics in the US for quite some time. The politics have impeded on the progress to reduce global warming. One of our main contributions to Climate Change aside from the food industry, is the automotive industry. Nearly 30% of US global warming emissions come from the transportation industry. If the infrastructure of the US was modernized by the electric car, a potential huge chunk of these emissions could be reduced. [11]



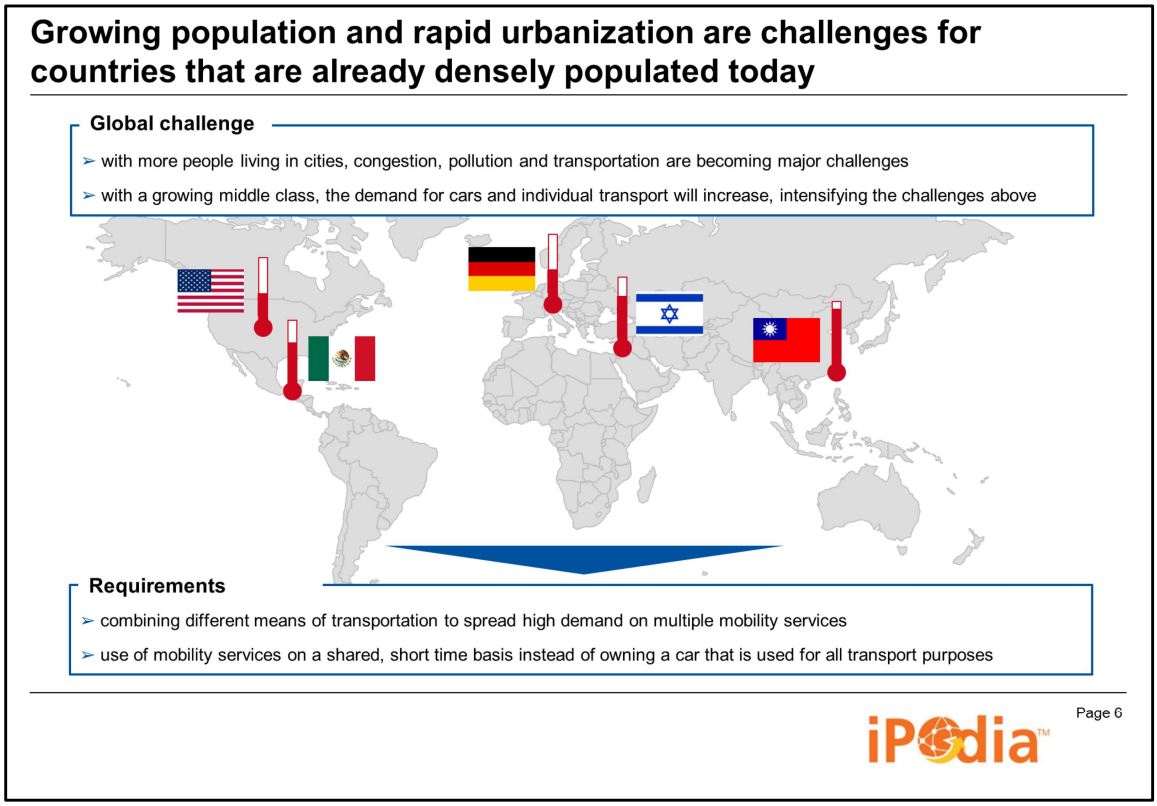
Germany is currently still heavily dependent on imports of fossil fuels (import share of 61,4 percent by 2014). Oil contributed to 35 percent to Germany's primary energy use in 2014, but its share has been steadily decreasing since 2000. Since most oil is used for transport, electric cars can boost the production of renewable energy for transport and thus decrease Germany's dependence on oil imports. [1]

Since Taiwan lacks energy resources and highly depends on import (98% of energy supply, with oil accounts for 48.9%, coal 29.4% [3]), developing clean, sustainable and independent energy has long been Taiwan's top goal. After the great earthquake and the resulting nuclear disaster in Japan in 2011, there have been debates about whether we should abandon nuclear power which accounts for 6.3% of Taiwan's energy supply. However, without it, we need to cover this part with oil and coal, which leads to higher dependency on fossil fuels.

Petroleum and its products supply some 60% of Israel's energy consumption. To reduce the country's dependence on imported oil and strengthen its economy the Ministry of Energy and Water Resources promotes oil and natural gas exploration onshore and offshore Israel [4]. Over the next few years, low-pressure natural gas infrastructures will be developed.

Mexico is a country that still depends to a large extent on fossil fuels and derivatives (petroleum) to carry out their daily activities. The 70% of the companies in Mexico are considering adopt green policies and technologies, but in reality only 25% are willing to Buy these technological advances in the global market, this in order to replace the burning of fossil fuels with different alternatives.

Fossil fuels enable the US to function the way it does today. Without them, society as we know it would fundamentally not be able to function because of the integral way fossil fuels have been utilized in our daily life. Prices would rise and force business to close as well as the lower class to ultimately no longer be able to afford any of the amenities provided through the use of fossil fuels. [7]



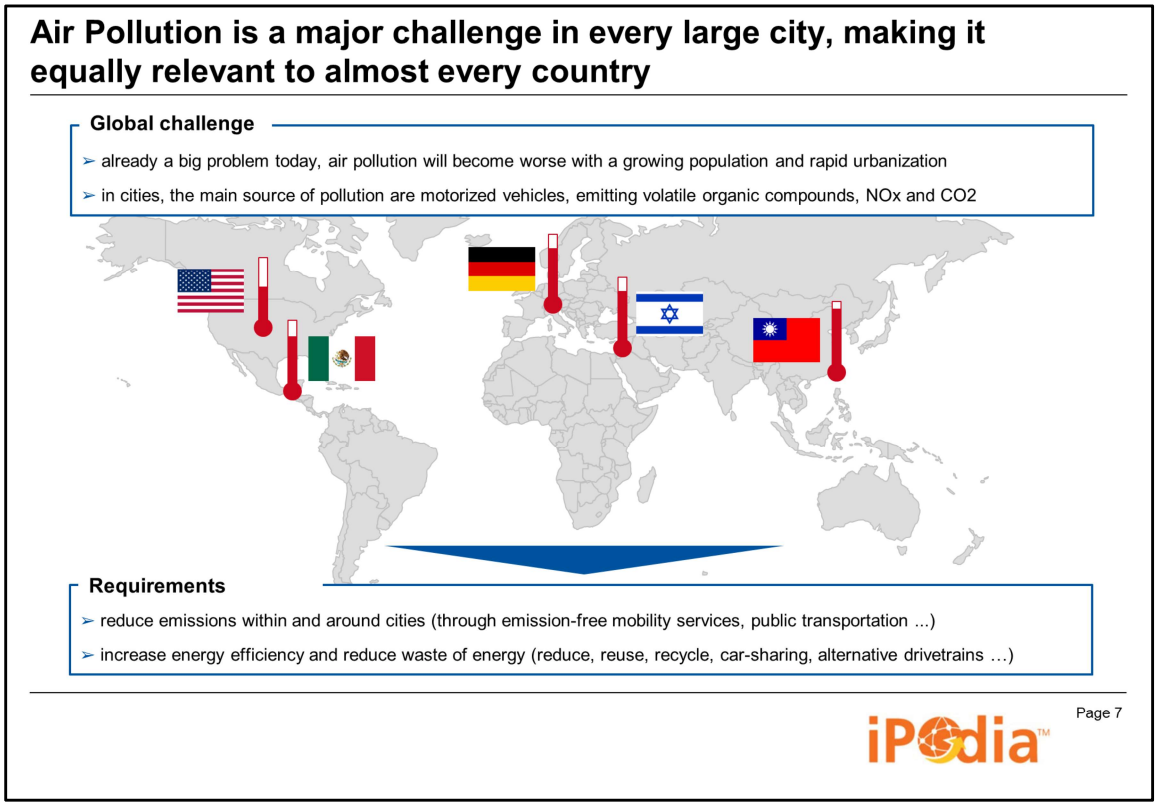
In Germany, urbanization and population growth is not that big of a challenge. While the percentage of the population living in cities is high (75%), the rate of urbanization is almost zero (world: 4,2 %). However, with a growing population, cities will become more crowded nonetheless and different means of transportation will have to be developed to allow efficient transportation. [1] [2]

In Taiwan, more than 80% of people live in cities [3] in search for jobs, which leads to an increasing urban-rural gap. However, the growth rate of total population will become 0 or even negative in the next 5 to 10 years, so there won't be a significant increase in urban population.

Israel is considered to be one of the most highly urbanized countries in the world. With 92.1% of its population living in cities, mainly in one of the 3 densely populated metropoles of Tel Aviv, Jerusalem and Haifa, Israel is ranked 13th in the CIA world urbanization rank [4]. However, according to the UN Department of Economic and Social Affairs, Israeli population growth is relatively moderate with the annual rate of 1.66% [5].

Urban growth in Mexico is made up of different causes such as industrial development in the last 20 years, the very high birth rate, the decrease in mortality, external immigration and internal migration, which is a displacement of the population. rural population to urban centers, attraction for industrial development that provides work and higher wages, and the attractiveness of large populations to acquire the best education, more amenities and entertainment and obtain a higher standard of living.

In the year from 2015-2016 the US population increased by 2.2 million people to a little over 323 million. This is the slowest growth rate since 1937. While this is not the first time the US has experienced slow growth, it is declining. Population growth is not a big issue due to this and rapid urbanization has also steadily fluctuated but in no way caused severe changes. [6]



With a pollution index of 27.18, air pollution in Germany is not as big of a challenge as in other countries. However, due to the popularity of diesel engines, most of the major cities in Germany have issues with high levels of particulates in the air, especially nitrogen oxides, which are dangerous to our health.

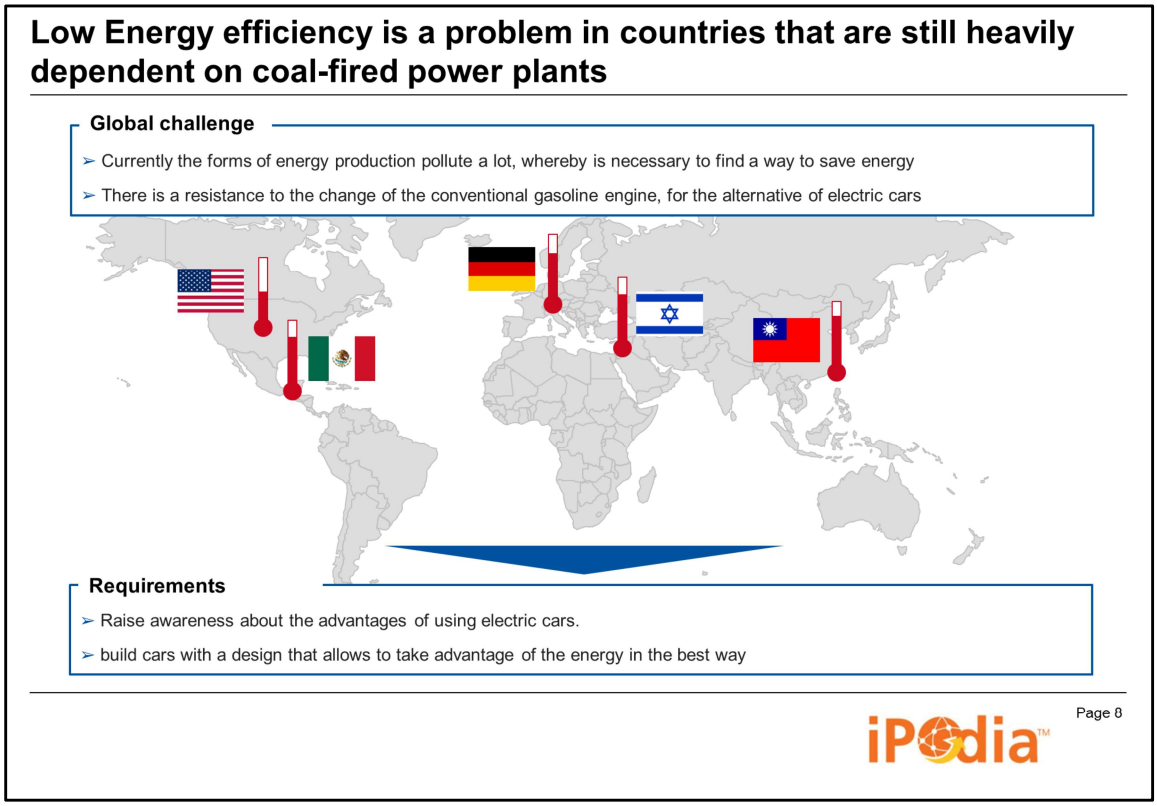
The average concentration of PM2.5 in Taipei City is 20 μg/m3 , which is much higher than the WHO suggested concentration of 10 μg/m3 [2].

Especially in winter, aside from the pollution from China brought by the seasonal wind, air pollution produced by heavy industry, scooters and coal-fired power plants in Southern Taiwan make the air quality much worse then (more than 70 μg/m3 [3]).

Israel is ranked 12th from the bottom in air quality, according to the World Health Organization[4]. A multi-systemic solution program for the Israeli air pollution problem has been formulated and accepted by the Israeli Ministry of environmental protection after the 'clean-air-law' took effect in 2011, but the budget required for its implementation, which is estimated to reach 200 million USD, is yet to be found.[5]

In Mexico, air pollution is one of the most important problems in big cities, since people must tolerate contamination levels above what is recommended. One of the most serious problems about air pollution in our country is the lack of effective control standards. There are very harmful particles floating in the air that exceed the recommendations, but there are no official rules that put limits on them, or those that exist are outdated.

While the regulations on air pollution are strict, prohibiting around 200 of the hazardous toxins, long distance visibility has been reduced by about 70% in a majority of places. Obviously worse in cities, the release of toxins are still not completely under control. Companies can emit toxins as long as they are under the specified number but if enough companies produce at that level over time it becomes harmful. [6]



Taiwan heavily dependent on steam turbine coal-fired power plants, which are not quite efficient [1], not sustainable and producing large amount of heat and air pollution and CO2. We have potential tidal energy, which should be an efficient way of electricity generation [1], nearby, but due to geological and technical issues, we are still working hard on this part.

Israel's electricity generation capacity is growing in a slower rate than increasing demand and consumption. Israel is suffering from a chronic shortage electricity manifest primarily at times of peak demand in the summer and winter.

Currently, there are many ways to generate energy in the world, in Mexico the predominant is thermal with 73.6% in the country. For this type of energy fossil fuels are necessary, which currently and at least in our country because of the high price of these, we believe that it is not the most efficient or best way to create energy.

The US is the world's largest energy consumer and therefore an increase in energy efficiency could have a huge and lasting effect on the world. Energy efficiency is also a political issue that addresses the fight between greedy companies and companies that are fighting for the future of the world in pursuit of improving every day energy consumption rates. [3]

Because of the energy revolution in Germany many former important sources of energy (e.g. nuclear energy, burning of ignite) are being disestablished. The high investments for renewable energy sources and the highly volatile availability of electricity leads to strongly increasing prices for electricity. These increasing prices require people and companies in Germany to come up with solutions to improve the energy efficiency or save more energy. [4]

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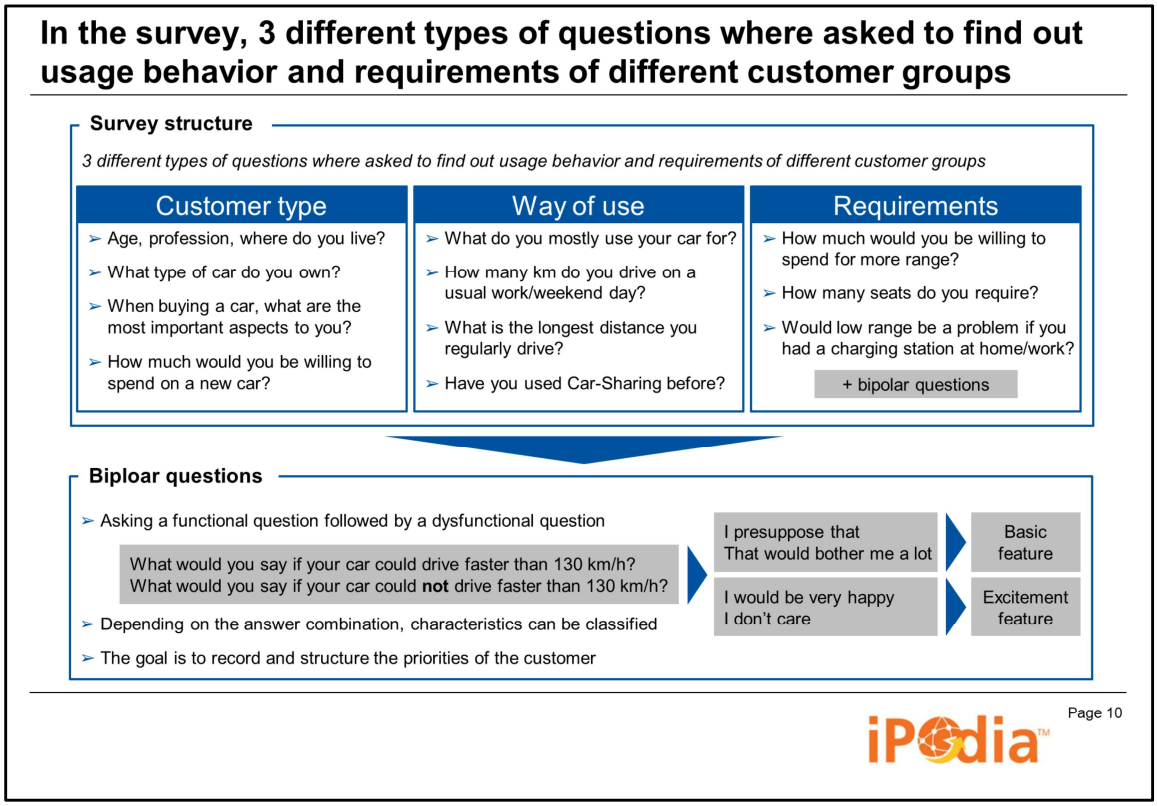
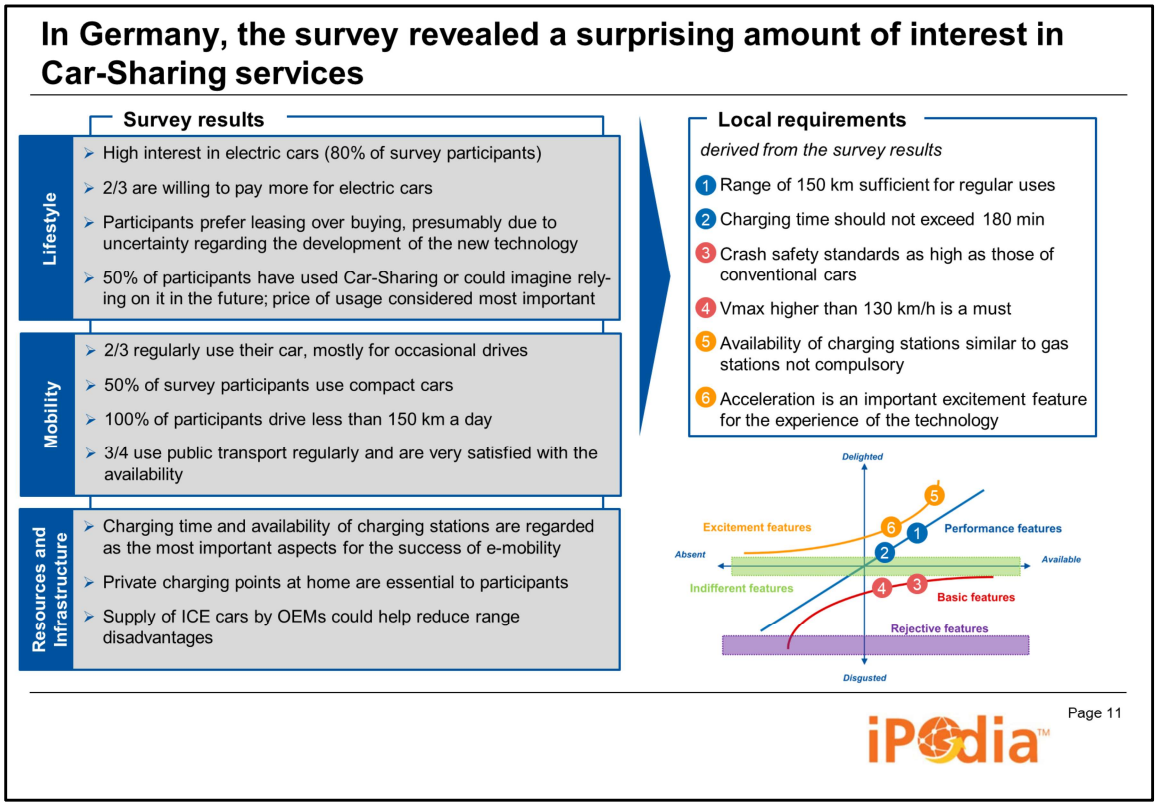


To best determine different types customer groups and their car-usage behavior as well as their requirements, we chose to split the survey into three different segments. The first segment consists of questions about the age, profession and living environment of the participant and allows us to detect different customer groups with similar usage behavior and requirements within the group. In the second segment, questions about the way participants use their car help us to find out what customers need the product to do. The third segment sets the focus on finding specific customer needs.

To classify the customer needs derived from the survey and apply them to Kano's Model, we included bipolar questions in segment three. Based on the answer combination, these types of questions allow us to easily distinguish excitement, performance, basic and rejecting features. However, we also included open questions to find out what degree of fulfillment of different customer needs leads to what kind of feature classification.



The survey allowed us to reveal the following findings about the lifestyle of customers, Mobility characteristics and Resources and Infrastructure in Germany (see slide).
Regarding the Lifestyle, the interest in e-mobility, the willingness to pay for it and the preference of business model were investigated. For the Mobility the way of use was inquired. Finally, opinions on several elements concerning the resource and infrastructure have been collected.

In the following some local requirements have been derived and applied to the Kano-Model. It was revealed, that a range of 150km for regular uses is sufficient to all participants. People are willing to pay more money for higher ranges, even if not regularly required. Regarding the charging time, participants were happy when it took 30min but upset, when the time exceeded 180 min.

Germans presuppose that crash safety standards for electric cars should be at least as high as those for conventional cars and they do not accept maximum speed of less than 130km/h. This can be typical, because Germans love driving at high speeds on their highways.

Guaranteeing the same availability of charging stations as gas stations is often stated as a fundamental challenge for e-mobility to succeed. However, the German interviewees considered this to be an excitement, rather than a basic feature. Over the majority stated, that a charging point at home and one at work would in most cases be sufficient. The same applies to the high acceleration of e-cars.

In Mexico, the main factor discouraging customers from electric cars is the price

Survey results

Lifestyle

- 87.9% are interested in electric cars but only 21.2% are willing to buy one.
- Of the total of respondents, most prefer the purchase of the car (72.2%),over the leasing.
- The main factor that discourages the purchaser from buying an electric car is because it is very expensive(45%).

Mobility

- 72% of the participants use compact cars, and the total number of respondents mostly use the car to travel long distances.
- The 88.9% use the their cars in city and the 55.6% drive between 5.000km to 20.000km per year.
- 69.7% of the total participants use public transport, and 2/3 of the population considers ,the availability of public transport is regular.

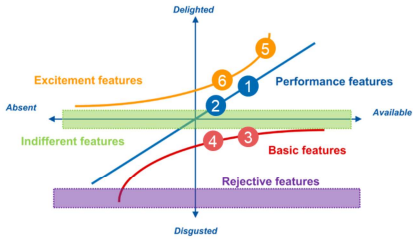
Resources and Infrastructure

- Availability of Charging station and Purchase Price are the most relevant aspects for the respondents.
- Private charging point at home and at work is very important for participants
- People want that the network of charging stations be as dense as the network of petrol stations

Local requirements

derived from the survey results

1. Purchase price is very important
2. Charging time should not exceed 180 min
3. It must be for at least 5 people
4. At least 150 kms per charge
5. Availability of charging stations similar to gas stations not compulsory
6. It must be different in design than conventional cars



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Most people are interested in new electric cars, but only few can buy or are willing to buy one. The most important thing is the price, it must be accessible, since prices are currently much higher than conventional cars.

Although the majority of the population uses compact cars, the electric cars in which they are interested must be for at least 5 people.

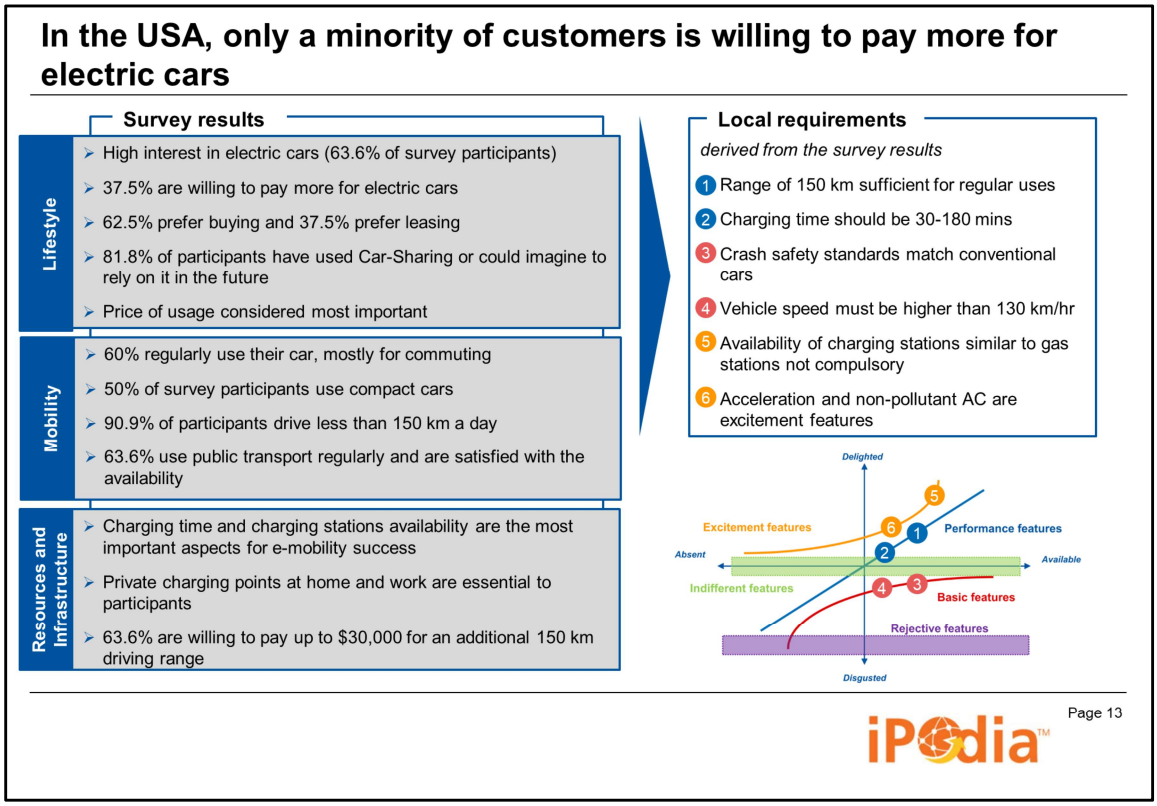
They must be cars for the city, since that is where most people use them, many people prefer to use their cars for daily use instead of public transport.

There must be charging points available, as there are currently gas stations everywhere. It is also essential to have one at work and at home.

It is essential that each load yields at least that of a normal day in the city (150 kms)

Most people in Mexico use their car to go to work, so using an electric car should represent fuel savings.

In Mexico the car is used almost daily, so electric cars would help the environment in big cities, especially talking about air pollution, which is currently a big problem in Mexico City



Although, in the United States, there is a high interest in owning electric vehicles, slightly more Americans have used Car-Sharing services and continue to rely on them. However, most own their automobiles regardless of use of public transportation (despite being satisfied with public transportation within the United States). While a small portion of Americans are willing to pay more for electric cars, the majority believe that electric vehicles currently cost too much—initially and throughout the car's lifespan. Since many people in the United States primarily use cars for commuting to and from work and/or school, electric vehicle driving ranges that accommodate less than 150 kilometers per day must be considered when designing and innovating such automobiles. Since many customers are commuters, crash safety, moderate speed (e.g. >130 km/hr), and private and public charging stations (30-180 min/charge) must be accommodated. Americans are also willing to spend $10,000 upfront on an electric vehicle with the aforementioned range and up to $5,000 for each additional 50 kilometers (maximum 150 kilometers). Thus, price and range are critical to whether or not an American will purchase an electric vehicle. Whereas, acceleration and non-pollutant air conditioning are extra features that Americans are excited for.

In Taiwan, the main factor discouraging customers from electric cars are concerns about the availability of charging stations

Survey results

Lifestyle

- Nearly half (45.8%) prefer to have their own car to car-sharing.
- 79.2% are interested in electric cars but only 12.5% are willing to buy one.
- The major factor that discourages the purchaser from buying an electric car is because of the concerns about availability of charging stations. (37.5%)

Mobility

- 100% drive less than 50 km on a usual work day.
- 54.2% of total regard it unnecessary to buy a car because 75% use public transports regularly.
- People are not heavy user of cars, 50% use their cars less than once a month.

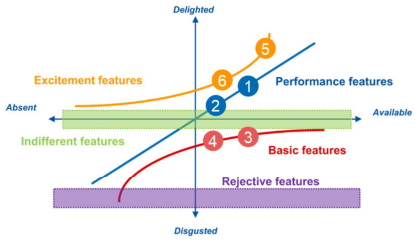
Resources and Infrastructure

- Among additional equipment, crash safety standards and air filter are most important factors.
- People prefer charging point at workplace to that at home.
- Charging time and availability of charging stations are the important factors of e-mobility success.

Local requirements

derived from the survey results

1. Charging time should be 30-180 mins
2. Impressing air filter is an important feature for technology
3. Crash safety standards as high as those of conventional cars
4. At least 5 seats included
5. Availability of charging stations in workplace
6. Make customer feel unique and cool to possess their own car



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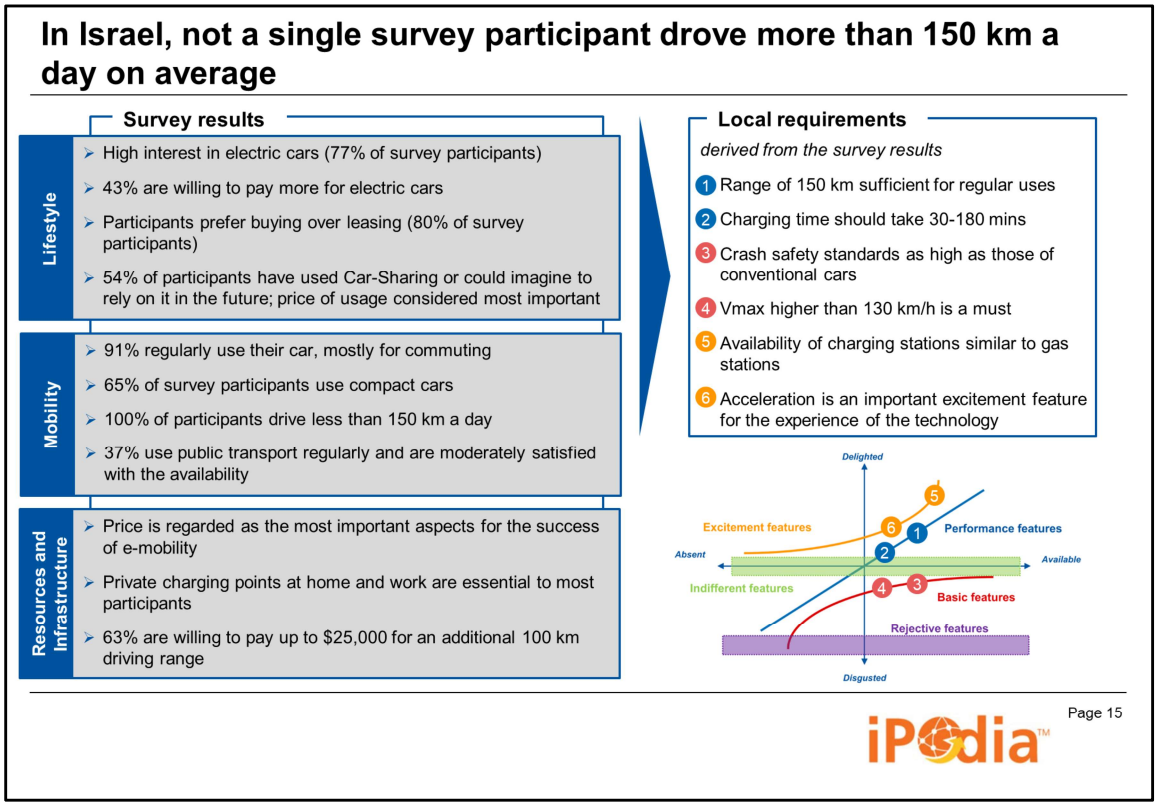
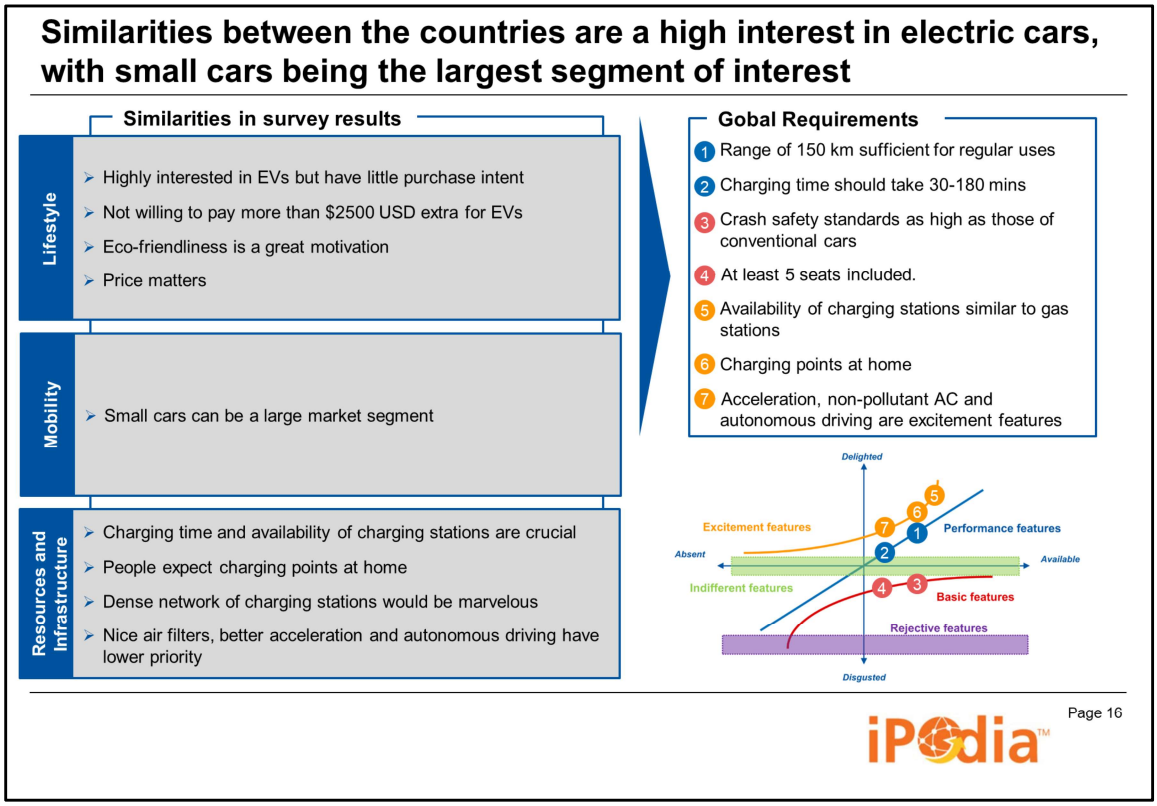
Nearly half still want to have their own cars. If they are considering car sharing, price is the most important factor. Most people are interested in electric cars, perhaps because to them it's new and fancy technology, but they don't have much intention to buy one. When it comes to price, more than half are not willing to pay much more than traditional cars. People's concerns about e-cars diverse, the availability of charging stations being the major one. Since Taiwan is a small island, people usually drive less than 50 km on w.

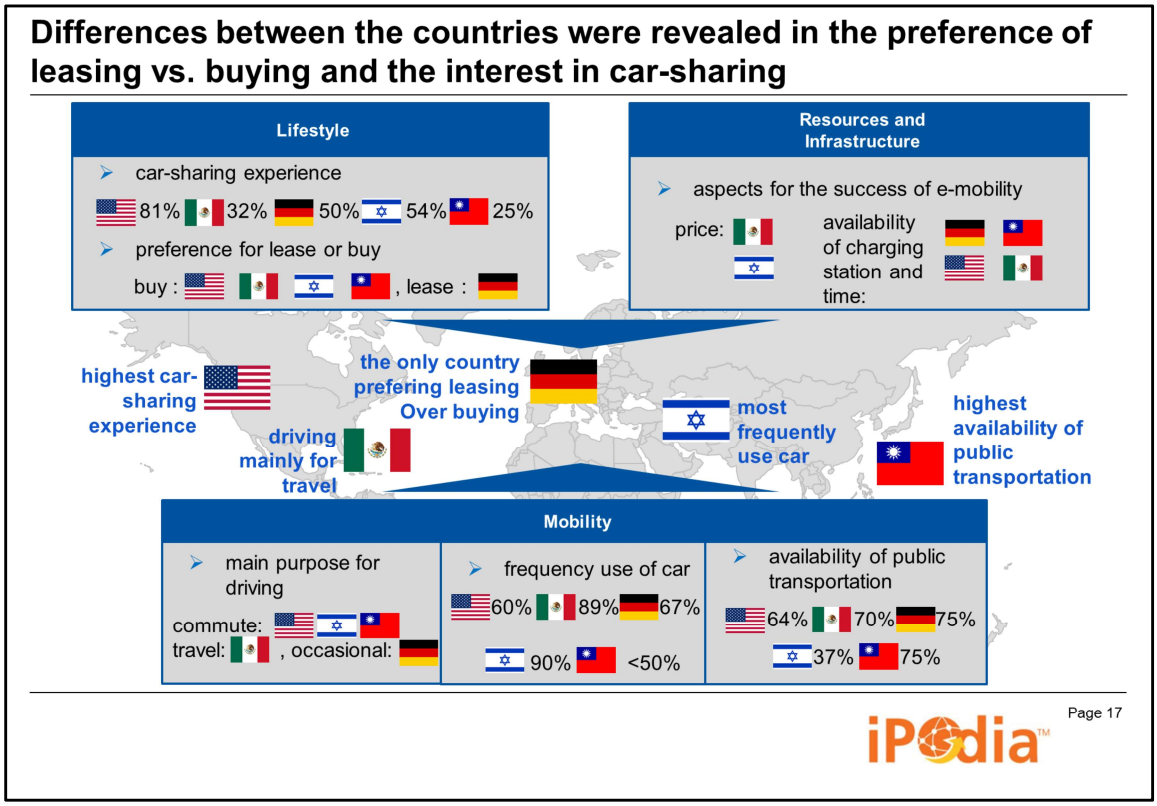


Ownership of a private car is common in Israel, mostly for a daily use, probably due to a relatively poor availability, connectivity and infrastructure of public transport. As most Israelis do not rely on public transport, the ideal car should have characteristics which meet the requirements of both urban and long-range driving and include 5 seats.
Most people will not compromise on safety and require high standards in terms of crash safety. Maximum speed of car is also considered to be an important factor as participants stated they will not compromise on Vmax lower than 130 km/h. however, as the notion of electric cars relates to green environment, most participants stated that the absence of polluted air filter of the car's AC would bother them to a degree, while having it would be happily accepted. Futuristic and luxurious attributes such as autonomous driving and improved acceleration are clearly to be significant excitement features.



Price plays a significant role in all survey terms – most people would not accept paying more for an electric car in comparison to a regular one, a significant part will avoid purchasing an electric car if it's price is too high and according to most participants, price is the most important factor when buying a new car. Concerning mobility, small cars are the largest segment of cars owned by survey participants in every country.

Most participants stated that the absence of polluted air filter of the car's AC would bother them to a degree, while having it would be happily accepted. Futuristic and luxurious attributes such as autonomous driving and improved acceleration are clearly to be significant excitement features. Participants from every country agree, that charging time and availability of charging stations are crucial.

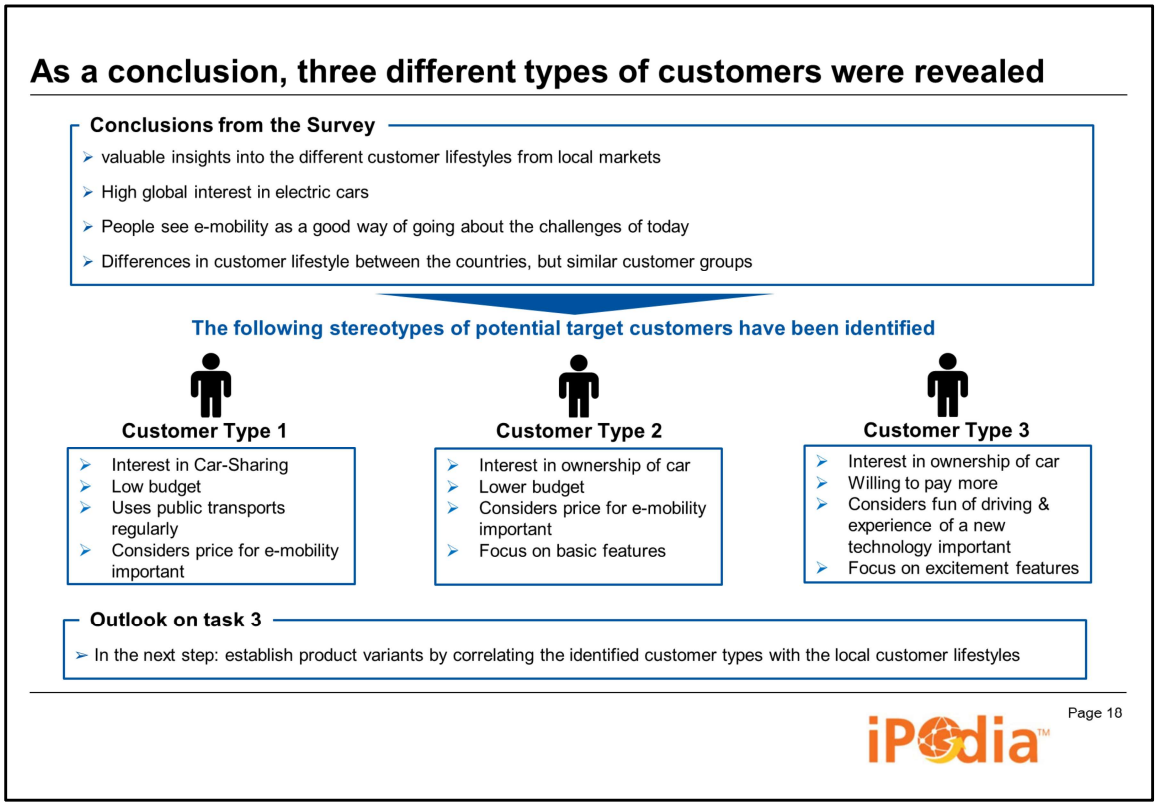


After integrating the survey results, we concluded the several differences in different categories, and listed the most significant ones as follows.

For lifestyle, car-sharing experience and preference for leasing or buying a car have significant differences between each country. U.S. has the highest ratio (81%) of car-sharing experience while Taiwan has merely 25% of total participants get car-sharing experience. On the other hand, Germany is the only country that prefer leasing a car to buying a car and presumably due to uncertainty regarding the development of the new technology. Other countries prefer buying to leasing, with Israel stands for the highest percentage (80% of total participants) in favor of buying a car.

Then, there are three main differences about mobility. First of all, the main purpose of driving is commuting for U.S, Israel and Taiwan. Mexico, however uses car mainly for traveling far distances. And Germany mainly uses car for leisure and occasional drives. Secondly, we found out there is a high 90% of participants in Israel frequently use their car, while in Taiwan, only less than 50% of people drives frequently, some even drive less than once a month. Lastly, for the availability of public transportation, Taiwan and Germany rank first for 75% of participants think it convenient to commute by mass transit system. And Israel stands for 37%, making sense that it is the most frequently-used car country.

Last we looked at resources and infrastructure. Mexico and Israel consider price to be the most important factor of e-mobility success. And Germany, Taiwan, U.S. think that the availability of charging stations and charging time are the most important factors when it comes to the success of e-mobility market.



The survey allowed us to gain some valuable insights into the different customer lifestyles from local markets. We structured the survey in a way, that allowed us to differ between the customer lifestlye and the requirements. It was important to us to not purely investigated customer lifestlye by asking for the relevance of certain features, but rather by understanding the customers journeys on how they integrate the concept of mobility within the daily lifes. We noticed, that the global interest in electric car was high and that people acknowledge the fact, that e-mobility can be a good way of going about the global challenges of today.

We deduced from our research, similar local requirements regarding specific features that the EV would have to meet (big similarities regarding the minimum range, the importance of the price, crash safety, autonomous driving etc..) We also noticed, that the customer lifestyle varied to some extent between the local markets. However we were able to regcognize some patterns that made it possible to identify three stereotypes of potential target customers.

In the next task, the product variants will be established by correlating these customer types and customer lifestyles.

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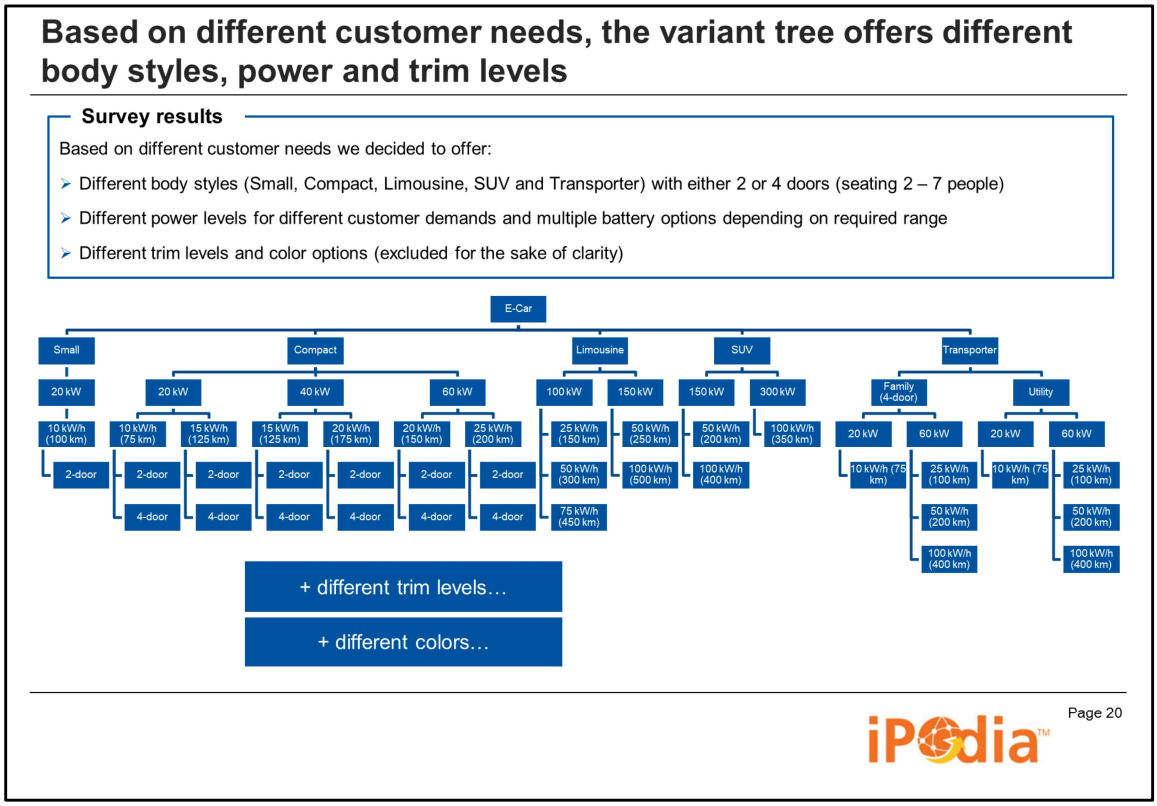

Setting up the variant tree, we first decided to offer different kind of body styles, including small cars, compact cars, limousines/sedans, SUVs and two types of Transporters, one for people offering seating for up to 7 adults and one for utilitarian uses. In a second step we agreed that different customers would be looking for different power and range options in a car so we did fundamental research on electric motors and battery capacities to determine which combinations allow which levels of range. Based on the research, we put together different combinations of power and battery capacity that customers might be looking for depending on their budget. These combinations added a lot of additional variants to the variant tree, which in the case of compact cars where further split up into 2-door and 4-door variants. For reasons of clarity and comprehensibility, the variant tree does not show options of color and trim levels in more detail.

The variant tree was narrowed down to eight variants, starting with a Compact Car for inner city Car-Sharing services

Selection criterias

- customer lifestyle shows global interest for Car-Sharing
- price of usage for Car-Sharing important for the customers
- Solution: Build a car that is as cheap as possible, compact (no parking problems) and suitable for occasional drives with small distances

Recommendation for a product variant 1

Short Description: Compact Car for inner city Car-Sharing services

Technical Details	Way of Use	Target Customers
➢ Compact Model ➢ 20 KW (low power) ➢ 10KW/h (75km range) ➢ 2 Doors (5 seater) ➢ low trim levels sufficient ➢ focus on basic features	➢ used for Car-Sharing purposes ➢ People for Car-Sharing require small distances and low costs of usage ➢ low production cost for manufacturer (smallest battery and engine) ➢ compact size for good parking	➢ mainly for city habitants that don't own a car, regularly use public transports and that are price sensitive (e.g students, tourists…)

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From the survey we derived the following product variant, which is purely focused on the appliance in Car-Sharing. We identified the requirement of a low price of usage as the key to success. Furthermore offering Car-Sharing requires for the car manufacturer to allocate a large amount of cars. This can quickly increase the investment cost.

In the USA, 81.8% use car-sharing and could see themselves relying on it in the future. With Uber and Lyft being the most well known there are a plethora of other start-up car sharing companies to meet the growing demand.

Car sharing is still not popular in Taiwan, so this product variant should enter Taiwan market several years later. However, the compact size can be an advantage since we don't have much parking space in cities.

The car sharing isn't popular yet in México, by the other hand this car has characteristics that can be useful, the low cost of acquisition and its small size to park, since in Mexico the amount of cars is large and parking spaces are insufficient. These characteristics could be of interest to consumers.

Car sharing barely exists in Israel, however as traffic problem is an exponentially growing problem in Israel, it might become more prevalent with time, mainly among people who would like to keep their transportation budget low, a target population who may definitely find that type of car satisfying for their needs

Interestingly Germany's customer lifestyle showed a high interest for Car-Sharing, even though the public transportations are more than satisfying. It seems that Car-Sharing would not be used instead of Car-Sharing but complementary.

A functional compact car fits to the needs of most customers

Selection criterias

- a majority of people own compact cars and prefer to own their own car
- Budget of customer <= USD $30.000
- functionality of car for the daily needs (no excitement features)
- City use, smaller range is acceptable

Recommendation for a product variant 2

Short Description: functional compact car

Technical Details	Way of Use	Target Customers
➢ Compact Model ➢ 20 KW (low power) ➢ 15KW/h (125km range) ➢ 4 Doors (5 seater) ➢ low trim levels sufficient ➢ focus on basic features	➢ Model that can satisfy most customer needs ➢ Enough range for the use within / between cities & occasional drives ➢ enough passenger capacity to guarantee flexibility ➢ compact size for good parking	➢ mainly for City habitants that prefer to own a car for a private use, but are price sensitive ➢ Car is considered to be purely functional

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From the survey we found, the largest majority of people rely on compact cars, with the preference of owning it. We were able to correlate that this customer group has a relatively small Budget for purchasing a car. Regarding the technical details we increased the range compared to the Car-Sharing model and chose a 4 doors variant

While 50% of americans drive compact cars, the majority of those people live in urban environments. This model could have a place in targeting urban markets while may be less spoken for in rural places.

This may not be popular in Taiwan. Although most people drive less than 100 km per work day, they would still choose cars with longer range due to the need of traveling around the whole island. Driving their own car wherever they want is much more convenient than going there by train and then renting a car.

The characteristics of this type of car are good for the buyers of Mexico (daily use, 4 doors, comfortable, easy to park) and despite having a high cost, many buyers would opt to buy it especially because most people they would buy the car they live in a big city.

This car might be ideal for the average Israeli who puts price on top priority, lives in urban or suburban areas with dense traffic and parking problems, and yet gets enough room for more passengers and a sufficient storage space which is also quite important for the typical Israeli who tends to buy a lot in the supermarket on weekly basis or loves to spend weekend outdoors hiking or camping.

According to the surveys this car would present be a good mainstream product variant for the german market.

A compact car with more power and features satisfies more sophisticated customer needs

Selection criterias

- This car addresses the customers that prefer compact cars without having to compromise on the features
- customer Lifestyle aspect: electro mobility will increase the fun of driving
- flexibility: higher range than required for the use in cities (>150km)

Recommendation for a product variant 3

Short Description: Compact car for more sophisticated customer needs

Technical Details	Way of Use	Target Customers
➢ Compact Model ➢ 60 KW (strong power) ➢ 25KW/h (200km range) ➢ 4 Doors (5 seater) ➢ high trim levels desired ➢ focus on excitement features	➢ for occasional & leisure drives within and around the city ➢ model to satisfy special customer needs of the younger generation ➢ sportive driving experience guaranteed ➢ compact size for good parking	➢ mainly for City habitants that prefer to own a car for a private use/ leasing, but are not strongly price sensitive ➢ Car is build to be "fun2drive" and to fulfill more individual customer needs ➢ relevant for : young professionals, working singles

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From the survey we found, that among the reasons for buying EVs participants named the experience of new technology and the fun to drive electric cars. This product variant was derived for customers that rely on compact cars but desire to experience the excitements of the new technology to the fullest.

50% of Americans drive compact cars and a staggering 90.9% drive less than 150 K a day. This lends itself to consumers who live in urban environments or live close to where they work. There is a large market for young professionals and working singles especially in urban environments which this model lends itself to.

This model can be a good fit for Taiwan, for those who drive compact cars but can afford some extra features. Young generation are more willing to try EVs and would like this model if the price is not too much higher than conventional cars.

This car couldn't be a good option for Mexico's because only 5.2% of the population drives sports cars. However it is still a good option due to the use that can be given in cities or big cities and for the people who like to drive sports cars (mainly young people) would be willing to buy it if the price does not soar.

This car could fit a significant part of the Israeli market - people who live in urban environments and would rather having a compact car but work far from home, drive relatively long distances and would compromise on comfort.

Germans have a great passion for cars. Having an EV where customers get a high amount of excitement features could be well accepted in the local market. In addition, Germany has a large lower middle class that could be able to afford this product variant.

A functional Limousine (Sedan) guarantees a higher level of comfort and flexibility at a fair price

Selection criterias

- a majority of people rely on limousine cars and prefer to own their own car
- Budget of customer => USD $30,000 - USD $60,000
- functionality of car for the daily needs (no strong focus on excitement features)

Recommendation for a product variant 4

Short Description: functional Limousine (Sedan)

Technical Details	Way of Use	Target Customers
➢ Limousine Model ➢ 100 KW (normal power) ➢ 50KW/h (300 km range) ➢ 4 Doors (5 seater) ➢ low trim levels sufficient ➢ focus on basic features	➢ enough load and passenger capacity to guarantee enough flexibility ➢ ideal for daily commuters looking for the comfort of a limousine ➢ low cost of ownership	➢ For City habitants and those living in the suburbs ➢ Private users (e.g. families) and businesses (e.g. taxi, Uber), commuters

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Apart from the compact car owners our surveys showed that a non negotiable amount of participants required limousines. This product variant has been derived similarly to the functional compact car variant, with the difference that the budget of the customer is higher.

Due to the fact that 62.3% of Americans prefer to buy instead of rent, it is unlikely that this model would be popular because limosene style vehicles are most always rented and used as a luxury for business executives and special occasions.

Most people in Taiwan buy normal sedans, and this model has longer range that can satisfy people's most needs, so if the cost is low enough and the charging facilities are well installed, this model would be accepted.

In Mexico, limousine-type vehicles are not very popular because, despite being cities, most of their streets are small, which for long vehicles is difficult to handle and park. Generally, these types of vehicles are not purchased, they are rented for transportation purposes. work, however 16% of the population is interested in buying cars of this type which doesn't rule out the option of buying a car of this type.

Sedan cars are quite popular in Israel. as car prices are relatively high here, when people buy cars they think how it fits them on the long term and therefore the sedan car has a good and credible image in Israel which would make it easier to be accepted easily by a vast variety of different crowds here.

According to the surveys this car would present be a good mainstream product variant for the german market. The power of the engine would allow to drive at a maximum speed higher than 130km/h which is important for germans, particularly on the highways.

SUVs offer the space of a Van without sacrificing power, features and design

Selection criterias

- people that are in the luxury car market often look for design and lifestyle to distinguish themselves from others
- SUVs have been rising in popularity, especially in wealthy countries
- Offers space without sacrificing power, features and design

Recommendation for a product variant 5

Short Description: SUV combining functionality and lifestyle

Technical Details	Way of Use	Target Customers
➢ SUV Model ➢ 150 KW (normal power) ➢ 100KW/h (400 km range) ➢ 4 Doors (5 seater) ➢ high trim levels desired ➢ focus on excitement features	➢ enough load and passenger capacity to guarantee enough flexibility ➢ longer drives in the countryside, highways, offroad driving ➢ high comfort and safety, but also utilitary missions	➢ For lifestyle sensitive customers, that are not price sensitive ➢ for people living or working in the suburbs, mountainous landscapes and regions with strongly varying climates

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As with the luxury limousine, survey results show that powerful offering size and flexibility are in great demand. They offer more uniqueness and lifestyle features than other cars of their size and, due to the willingness of customers to pay a premium price for that, can drive up the margin and increase the awareness of the new company.

This model would be great for wealthier parents or people who live in the suburbs from the Upper Class. This is similar to an Audi Q5 which has done extremely well in the united states.

More and more people buy SUVs now in Taiwan. This model would be great for wealthier people, as they can afford potentially higher prices and that they would like to try new fancy EVs and the excitement features. When advertising, we should focus on lifestyle.

SUVs are gaining more and more popularity in israel nowadays. excitement features should get focus on such a car to place it on one level with the luxury well-known brands.

In México SUVs are entering the market due to their characteristics such as their ability to travel long distances, their innovative design and high comfort and safety, however the price of these is still a major barrier.

SUVs have become very popular in Germany, so many people will prefer this over a sedan/station wagon. While the survey results also show a high interest in SUVs combining power, features and space, the inferior range compared to a sedan/station wagon might turn people away.

Vans offer the same space and variability as SUVs at a lower price

Selection criterias

- a lot of families with 2+ children that are looking for space are price sensitive
- Vans offer the same space and variability as SUVs at a lower price
- price sensitive customers are not willing to pay a premium for excitement features, focus on basic features and efficiency

Recommendation for a product variant 6

Short Description: Van for passenger transportation

Technical Details	Way of Use	Target Customers
➢ Transporter Model ➢ 60 KW (normal power) ➢ 50KW/h (200 km range) ➢ 4 Doors (7 seater) ➢ low trim levels sufficient ➢ focus on basic features	➢ enough load and passenger capacity to guarantee enough flexibility for transporting larger groups of people ➢ used for city, highways and countryside ➢ for private / business use	➢ price sensitive families (with more than 3 children), organizations, sport clubs ➢ shuttle services

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This model could takeover the “van” market in America since before, there has been no breakthrough of electric cars into the market. The majority of American families are price sensitive with 2+ children and could find great use for this vehicle.

Most private shuttle services in Taiwan make use of vans. The functions of this model seem to be generally the same as those of vans nowadays, so people would buy it if there’s some advantages in price. However, the size of this market segment is not large.

This type of car would be quite irrelevant in Israel. the notion of e-cars is related with a financial risk in Israel after a big company that tried to penetrate into the Israeli market with the idea faced a tremendous failure and went bankrupt. Trying to penetrate again the Israeli market with a car which is relatively costly and probably requires a long charging time might be very difficult.

For Germany the popularity of this product variant will hugely depend on the price. Most families buying Vans are very price sensitive, while wealthier families will prefer SUVs instead. At the same time, the range is too low to compete with Vans already in the market today that are used for longer trips and holiday routes. However, this variant could become popular with inner-city transportation services like taxis and shuttles.

This car could be very popular because it is not focused on excitement features, only in the operation that is good enough, so if there was a price flexibility based on the characteristics that the customer wanted, the product would be sold fairly well in Mexico.

A truck for business use focuses on low cost of ownership and low-range city use

Selection criterias

- the trucking business has not been innovative in some countries in recent years
- with a growing population and rapid urbanization, trucks with common diesel engines will further increase traffic and air pollution in cities
- for business use, focus on low cost of ownership and low-range city use

Recommendation for a product variant 7

Short Description: Transporter for inner-city utility purposes

Technical Details	Way of Use	Target Customers
➢ Transporter Model ➢ 60 KW (normal power) ➢ 50KW/h (200 km range) ➢ 2 Doors (2 seater) ➢ low trim levels sufficient ➢ focus on basic features	➢ adapted for the utilitarian use within and around cities ➢ low cost of total ownership ➢ high cargo capacity ➢ reliable and robust structure	➢ people that require a car for transporting goods and utilities at low price ➢ e.g mechanics, logistic companies

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As an electric truck, this variant will not be able to compete with larger semi trailer trucks used by logistics companies for nationwide transports. However, it will be superior in short-distance, inner-city use cases where internal combustion engines lack efficiency and produce emissions that are dangerous to people's health.

The trucking industry is widely controversial in America and has not been improved on in decades. An electric car with low cost of total industry and high cargo capacity could be revolutionary.

Many Taiwanese merchants use small trucks like this to transport goods, so I think they can accept this model. The low cost would be a good incentive for them.

This type of car could succeed on the industrial market in Israel if its operational costs would be lower in comparison to the regular trucks.

This type of car is already being produced and sold successfully by streetscooter, so the competition is high in Germany. However, the market might be big enough for two players or a player offering more range than streetscooter at a comparable price.

This car is very popular in Mexico due to the ways of use, mainly used by street vendors, if the purchase price is low, a large part of the market would be willing to buy this vehicle.

The bE-Smart is our answer to rapid urbanization and the lack of parking spaces in cities

Selection criterias

- with rapid urbanization, the lack parking spaces in cities will increase in the future
- many prefer individual transportation over public transportation for more flexibility
- focus on basic features and low-range city use to keep prices low and compete against scooters that are widely used in many countries

Recommendation for a product variant 8

Short Description: bE-Smart

Technical Details	Way of Use	Target Customers
➢ Small Model	➢ easy parking within cities	➢ singles, students, scooter drivers, restaurants
➢ 20 KW (low power)	➢ single person transport uses	➢ people with small availability of parking possibilities
➢ 10KW/h (100 km range)	➢ for food delivery	
➢ 2 Doors (2 seater)	➢ alternative to scooters	
➢ low trim levels sufficient		
➢ focus on basic features		

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Parking spaces in cities are becoming increasingly rare, so people driving in cities a lot might be looking for a second car just for this purpose.

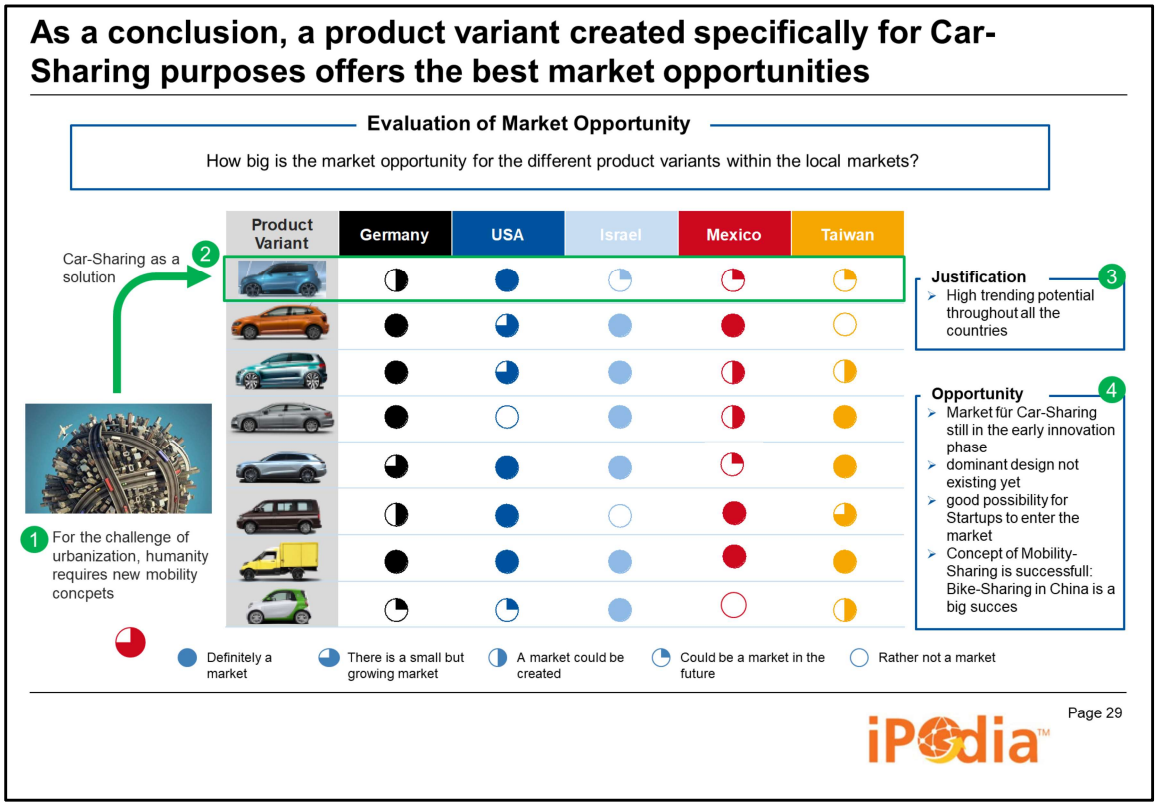
While 50% of users own compact cars, few are actually “smart cars” this model would be most successful in urban environments but even there, these kinds of vehicles are often met with great skepticism in the US.

Taiwanese people ride scooters a lot because most of the time we go to places within a short distance. Also, people who cannot afford a car use scooters instead. This model can be a good substitute for scooters if it’s price is low enough, but parking space would be the main problem. If this can be solved and the price is low enough, some scooter-riders would buy this small car.

One of the best models to succeed in Israel as an e-car. It’s price and size fits perfectly to the bigger dense cities, it’s charging time would be the lowest among all models and urban charging infrastructure for that car would probably be the cheapest and easiest to operate.

In Germany, most people are in the market for small to compact size cars. While this variant will very rarely be able to replace a car from that category with ICE due to the limited range and flexibility, it could become very popular for inner-city uses like food delivery and Car-Sharing.

In Mexico this car would not be a very good option, although it has an attractive design, easy to park. could not be handled easily in the city due to long distances, and the imperfect ones of it, such as: very steep curves, potholes which would make it dangerous to drive this type of car.



In the final step we evaluated the market opportunity of all of our derived product variants within the local markets. From the analysis of the global challenges (task 1) we noticed that four of these challenges can be gone about by electrifying cars. However for the challenge rapid urbanization we found that only the electrification will not be helpful, and that new mobility concepts will have to be developed.

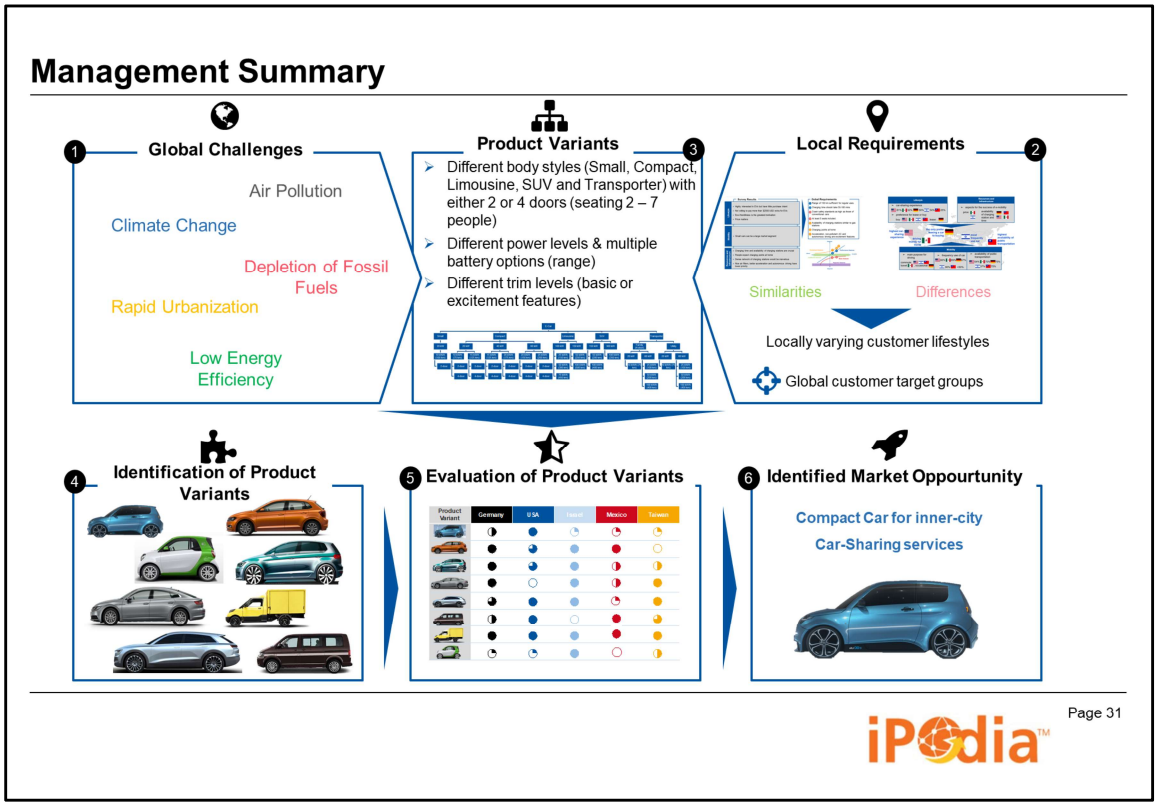
This justifies the vision of our Startup to focus on new mobility concepts and thereby build the future. As a result we decided to choose the product variant designed for Car-Sharing (product variant 1).

Not only is this the product which enables new mobility concepts, but from our survey we identified it to be the product with the highest potential of guiding towards a new mainstream mobility trend (task 2).

One can wonder, why we did not choose one of the other product variants. The reason for that is, that we consider the other product variants to be designed for markets that are mostly already established and where the degree of competition with established car-brands is high. We see a particular opportunity within the Car-Sharing, mainly because of a market, that is still in the early innovation phase. The dominant design is not existing yet and therefore we estimate that there is a better possibility for our startup to enter the market.

Agenda

1. Global challenges and requirements
2. Survey results and classifictaion of requirements
3. Product concept and product variants
4. Management summary



Management Summary

In phase 1, we tried to list all possible challenges and then concretized 5 main global challenges and global requirements.

In phase 2, we dived deeper by surveying people's lifestyles and opinions of electric cars and about certain features. Those have later be applied to the Kano model. With these data, we got an understanding of the local requirements of each country and evaluated the similarities and differences between them.

In Phase 3 we combined everything together, and came up with a variant tree. From that we derived the best 8 variants, including compact cars and also larger cars like SUVs and trucks. We then evaluated the product variants regarding their potential of success throught the different local markets and concluded to start with the first product variant: "Compact Car for inner-city Car-Sharing services".

Outlook

It can be estimated, that the selected product variant could be quiet easily realized from a technological point of view. The production and material costs are particularly low (compared to the other product variants). The development costs can also be considered relatively low, because of the low focus on excitement features (higher trim levels). The challenge for introducing this product variant successfully in the market, would be to develop a suitable business model and build an infrastructure for charging.

Backup (not considered Prodcut variants)

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Selection of Product Variant: exciting limousine

Selection criterias

- quite a lot of people are willing to spend $65,000+ for a car with a range of more than 450 km
- these customers do not want to compromise when switching to electric cars
- needs to offer the same performance, range and features as as similar ICE car

Recommendation for a product variant 5

Short Description: exciting Limousine

Technical Details	Way of Use	Target Customers
➢ Limousine Model ➢ 150 KW (high power) ➢ 100KW/h (500 km range) ➢ 4 Doors (5 seater) ➢ high trim levels desired ➢ focus on excitement features	➢ enough load and passenger capacity to guarantee enough flexibility ➢ high level of comfort and safety desired, regardless of the price	➢ affluent customers that are not willing to make compromises ➢ business professionals, high-income households and families ➢ relevant for: Germany

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There is certainly a market for affluent customers who are also business professionals. These people would enjoy the focus on excitement features which would ultimately be one of the main selling points for them.

I think few people would buy this. People who seek luxury cars would prefer SUVs and are usually loyal to brands like Mercedes Benz and sports cars. Those companies would also have some excitement features, so this model is unlikely to compete with them in Taiwan.

Despite the good characteristics, this would not be very popular in México because of it high cost, 98% of the population is willing to pay between $ 10,000 USD and $ 30,000 USD for a car for casual use or daily use. Only a small and specific sector would be willing to acquire this type of car.

We assume it would not be the best seller in Taiwan. People who would go for luxury would rather go for a well known brand and would avoid trying new types of cars unless it is stabilized as luxurious status symbol. Moreover, the extended range is irrelevant for a small country like Israel.

Germany is quite evenly populated, so not only inner-city transportation should be considered but also trips between cities, which can easily reach 500 km in distance. Furthermore, the survey showed that germans are willing to pay more for electric cars, even above $65,000 if the range is comparable to that of a car with internal combustion engine.

Selection of Product Variant: E-Ape

Selection criterias

- for a niche market: transport for rural areas
- benefits of e-mobility regarding higher transmission torque can improve the acceptance of this model compared to the conventional version

Recommendation for a product variant 10

Short Description: E-Ape (three-wheeler transporter)

Technical Details	Way of Use	Target Customers
➢ Transport Model ➢ 10 KW (low power) ➢ 10KW/h (100 km range) ➢ 2 Doors (2 seater) ➢ low trim levels sufficient ➢ focus on basic features	➢ cheap transport of goods within smaller distances ➢ suitable for densely populated regions and areas with difficult access (narrow streets) ➢ low cost of ownership	➢ workers, farmers in mountainous regions ➢ food deliveries ➢ developing countries

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These vehicles are often seen within rural areas for the transport of rather heavy goods but for shorter distances. Instead of tackling only mainstream markets with high competition, niche markets could present a good strategy for a startup to prove their abilities. Since e-mobility for utility purposes proves to be a good market (see success of the company Streetscooter in Germany), we decided to consider this niche product for the utility market. We estimated that the higher transmission torque that comes along with electrification of vehicles, presents an opportunity for replacing the conventional apes. This vehicle could furthermore be a good starting product for introducing e-mobility in developing countries.

There is little market for a car of this type although it could find success in the agricultural or rural area market if anything.

There's little need for this model. People would just buy a small truck for agricultural use or delivering goods.

Appeals to a very small and distinguished target crowd which is mostly old fashioned and not accepting easily the appearance of new technologies. Therefore, not expected to do very well.

There is little need for this model in Germany. The infrastructure is well developed and there are only few rural areas, where this vehicle could make sense.

This car would be a very good option for people who live in rural areas, which in Mexico are enough. Although the design is not flashy, if the characteristics of transport and efficiency are good, people would buy it.