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# The Role of Infrastructure in Tesla's International Expansion

Considering what has been said previously, it is clear the existence of a charging infrastructure is fundamental for the development of the electric car market. Tesla is planning to become a mass producer of electric vehicles and to do so it is necessary to have facilities that allow the company to produce enough vehicles and it is necessary that there are enough charging stations. Tesla is an interesting example and probably a benchmark for electric car producers. Indeed, it took some measures to overtake the main hurdles of electric cars. First of all, it is the owner of a widespread network of fast charging stations that work for Tesla cars, called Tesla Supercharger (Tesla motors Inc, n.d.).

Specifically, these charging stations are thought to charge Tesla's models and are exclusively for them, but also other electric cars can potentially use them. This means that Tesla is potentially ready to open its network to other producers and it demonstrates that its strategy is forward looking and that it is already planning that its charging system becomes the standard for the networks of the industry. Indeed, networks have effects on competition, as the Betamax – VHS case explains. Tesla knows the importance of networks on competition. In fact, it has released its patents so that every other company can use its technology, that is practically open source (Solomon, 2014).

Therefore, the company is ready to share its technology and its superchargers with other manufactures, how its CEO Elon Musk stated, but actually none of these seems interested. The reason of that can be found in the fact that some manufacturers are using different batteries that need to be charged at a lower voltage and some of them need an adapter to use Tesla's network. However, considering the fact that Tesla's technologies are open source, those car producers that are behind in developing electric vehicles may find convenient to adopt for free Tesla's high-quality and advanced technology to offer electric cars. This can certainly help Tesla Superchargers' technology to become the international standard in its industry. However, building a network entails costs and revenues. On the first side, Tesla burns a lot of cash to build the Super Charger network and it is forecasted that it still needs USD 1.9 – 7.5 Billion to match the convenience of the US gas structure, building 30,000 new Superchargers only in the United States of America.

How can it be sustainable for Tesla to continue expanding its network in order to practically keep its competitive advantage in the future? Tesla has already chosen to build directly its infrastructure also in foreign regions and is willing to affirm its technology as a standard. To do

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so, it can license the use of its superchargers, sharing the network and the costs connected to it. Moreover, increasing the number of users of the network it will be even more valuable and it will contribute more to the company's revenues. This network is already spread over North America, Europe (especially western), Israel, United Arab Emirates, China, Taiwan, Japan, South Korea, Australia and New Zealand. In addition, many new stations are being built and Tesla is very advanced if compared to other manufacturers or to energy companies. In particular, they are consolidating their network where there are already stations and they are planning to build some in Eastern Europe and also in Russia, near Moscow and Saint Petersburg.

Unfortunately, the rest of the world is still not served by Tesla Superchargers. They built these stations both in cities and on the speedways, so that it is possible to travel by car for long distances also if it is electric. Moreover, they signed agreements with many restaurants, hotels, malls and touristic resorts so that the owners of a Tesla will be able to charge it when arrived at their destination. These charging stations are called "Destination charging" and considering them and the Superchargers, Tesla has a very good network. This represents a competitive advantage for Tesla against its competitors, because it can offer to the clients a greater value. Indeed, at the moment a network of fast charging stations is certainly rare, valuable, costly to imitate and difficult to substitute. However, it is important to understand if it is sustainable or not in the future, allowing Tesla to gain even higher profits than its competitors. To do so, it is possible to undergo a sustainability test.

Three are the main measures that have to be considered: Difference between the product of the company and the competitors' ones, imitability, improvements. Starting from the first of the list, it is clear that Tesla is viewed as different from the customers, and this is due not only to the specific characteristics of its cars and to its brand, but also to the presence of the network of fast charging stations (DeBord, Tesla is about to report earnings — but no one will talk about its biggest competitive advantage, 2017). Indeed, Tesla's Super Charger network is the only one that is known in its sector, meaning that the large majority of the customers or potential buyers does not know any competitor networks, apart from the public ones. Who owns a Tesla will be able to charge its car in a network of well-located charging stations only for Tesla cars and he or she will be able to use also public stations or to charge at home. Therefore, Tesla is giving much more charging options to its customers than its competitors.

Secondly, it is not difficult to imitate Tesla's technology concerning the network, considering that now it is open source, but it would be difficult and costly to imitate the spreading of Tesla's network that today is already remarkable and that is ready to be extended and improved. Even if some competitors, as will be analysed below, have own networks or are planning them, Tesla will always be one step beyond them. Indeed, now it is already planning to improve its network and to expand it, whether the others are still planning it or do not offer the same benefits, such

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as fast charging. Lastly, Tesla is not only an automotive company, but also a high-tech company. Therefore, it is clear that improving its products is always their target. Indeed, it is working not only on new models, but also on ways to make its charging technology even faster with the new Super Chargers V3 (Lambert, 2018).

Therefore, it is clear that Tesla's competitive advantage passes the sustainability test. However, to analyse once again Tesla's competitive advantage and to check if it is sustainable or not, another strategic management tool can be useful, the business model canvas. In particular, under some aspects it can be useful to compare it to Tesla's competitors. First of all, the customer segment is populated of environmentally friendly people usually from the upper-middle class. Tesla's value proposition is based on safety, fast charging and on the possibility to charge a Tesla not only at home, but also in one of the Super Chargers or at a destination Charger. Customer relationships are based on Tesla.com website. Indeed, when surfing on it the customer is invited to a test drive and after the purchase, the main interactions between the company and the customer are made through the interface of the cars, that are constantly updated. For what concerns the channels, Tesla uses only its own stores, delivering through Service centres and Mobile Service Vans.

Tesla's key activities consist in improving its electric and self-driving models and in creating new ones, building them around the target customer in automated factories. Moreover, they are always innovating so that their cars need less maintenance and they release software updates constantly. The company's main resources consist in its engineers and its charging network, whether the key partners are locations where destination chargers are located. Tesla does not have service partners because it delivers by itself. At last, the cost structure is affected in particular by developing its new technology, considering both hardware and software. In addition, other costs sources are human resources, production, marketing, sales, and services.

On the other hand, the main revenue streams come from the sales of its cars, Model S in particular, and from the presales of Model 3. Also, maintenance and wall connector sales generate revenues for the company. Analysing its competitors, it is clear the difference between Tesla and them. For instance, BMW has very different revenue streams, comprehending also high leasing fees and rental fees. Moreover, its customers are performance driven and BMW wants to offer the ultimate driving experience. It has a traditional dealer network and its main partners are other car companies and IT firms. From this analysis it is easy to understand the differences between Tesla's business model and the one of a traditional manufacturer.

Tesla's competitive advantage is also made by factory automation and self-driving cars. Hence, it is clear that a lack in the network of charging stations can suppress demand (Todd, Chen, & Clogston, 2013) and that Tesla is the only company in the market that is investing to overtake these problems. The others rely mostly upon public charging stations. Therefore, the Tesla case

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is a virtuous example. Indeed, its main competitors, such as BMW, manufacture also internal combustion engines, whether Tesla only electric ones. So, it is fundamental for them to guarantee to its customers the possibility to charge their cars, otherwise it will be impossible for Tesla to reach its objective in becoming a mass producer. This strategy will certainly help Tesla in reaching its target of international expansion.

Indeed, the company did not focus its activities only on the United States of America but on many parts of the world, including both developed countries and some developing ones. However, even if Tesla's production facilities reached the target of 5,000 model 3 per week, these numbers seem to be quite low for a mass producer but, after all, it is only the beginning of its transformation from a producer of luxury electric vehicles to a global mass manufacturer. Moreover, Tesla needs to find a way to make its competitive advantage really sustainable. As already said, Tesla has had the foresight to create its own charging network, but it is also interesting to consider the position of its main competitors about the same topic. At the moment, no one of Tesla's competitors is planning to directly invest millions to build its own charging infrastructure (DeBord, Tesla is about to report earnings — but no one will talk about its biggest competitive advantage, 2017).

Actually, there is in Europe something similar to Tesla's Supercharger network. It is called "Ionity" and it is a joint venture between BMW AG, Daimler AG (Mercedes-Benz), Ford Motor Company Inc and Volkswagen AG (in particular Volkswagen, Audi and Porsche). It is planning to build 400 fast charging stations in Europe until 2020, with the first 20 ones placed in Germany and Norway near the speedways. Ionity is willing to become a highly reliable charging network all over Europe for all the owners of an electric car, but at the moment it is irrelevant if compared to Tesla's network. Indeed, there are only six open Ionity charging stations all over Europe. Moreover, it is fundamental to let the customers know about the launch of this network, but at the moment it seems to be absolutely unknown in Europe, whether Tesla's Superchargers are well known all over the world and are of the reasons why customers prefer to buy a Tesla rather than another electric vehicle (Van Den Steen, 2015).

Instead, in the United States of America there is a company called Electrify America, set up by Volkswagen AG that is going to invest USD 2 billion over the next ten years to build fast charging stations all over the USA. It uses a technology called "Combined Charging System" that is being proposed as an international standard against Tesla's Super Chargers. Even if many of these have been planned all over the country, only a few of them is already working, making it impossible to travel by electric car from the west coast to the east coast or vice versa. Actually, only 12 stations are working all over the USA (Electrify America Inc, 2018). It is therefore clear the difference between Tesla's spread network and Electrify America's one.

Furthermore, also in Japan there is another competitor that is building a charging infrastructure

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for electric vehicles. It is called “CHAdEMO”, that stands for “Charge the Move”. It is a Japanese joint venture between Tokyo Electric Power Company, Nissan Motor Company Ltd, Mitsubishi Group, Subaru Corporation and Toyota Motor Corporation (CHAdEMO, 2018). Their technology is being proposed as a standard, competing with Tesla’s and Volkswagen’s ones. CHAdEMO has built a very widespread network in Japan, building even more charging stations than Tesla (considering both Super Chargers and Destination Chargers). Moreover, it is present in many other Asian countries and it has a good spreading in Europe, comparable and overlapping to Tesla’s Super Chargers, and it is present in North, Central and South America, with a good spreading in the USA, even if less it is developed than Tesla’s network. Moreover, CHAdEMO has a good presence also in Oceania, in particular in New Zealand, and there are a few charging stations also in Africa.

Therefore, considering the actual spreading, only CHAdEMO seems to be really competing against Tesla’s charging network. However, there is an important difference between these two solutions. Superchargers are made to charge only cars made by Tesla and are very fast, whereas all the other charging stations are made to charge many different cars from different manufacturers and are less fast. Anyways, this exclusivity can add value to Tesla’s products and all the competitors do not have something similar and it seems that they are not even planning to do so. From this analysis it is clear that a charging network can have an impact on competition, but also that it is very expensive to realise. That is why it is interesting to understand the reason behind the choice of several companies to build a network together or all by themselves, as Tesla.

The main incentive that Tesla has to build its own network is given by the fact that, without it, it would be much more difficult to compete with other traditional manufacturers. Indeed, Tesla is willing to compete on a massive scale and no other manufacturer of electric vehicles has done this before. In fact, electric vehicles sales have always been very low in the past if compared to cars with an internal combustion engine. The only way to expand for Tesla is to guarantee to their customers that they can charge their cars and travel for long distances. In fact, there are not cases of mass expansion of electric cars producers without a charging infrastructure, because it always plays a big role. Nobody is willing to charge its cars in seven hours from standard sources but doing it in 20 minutes at a charging station is much more convenient.

Moreover, several standards are competing, and it is necessary that one of them affirms itself on the others. However, analysing them under a technological aspect, it is possible to notice some problems. CHAdEMO for example, has been introduced before Super Chargers, but these ones are growing much faster. Moreover, CHAdEMO uses a different connector and needs two different charging systems, one for fast charging and one for the slow one. This makes a car with the fast charging technology even more expensive. The problem is that standards do not coalesce and Tesla, like some other producers, is trying to affirm its own. Indeed, the lack of a

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unique standard represents a limit of the electric vehicle's market (Besen & Farrell, 1994). Moreover, owning the network, manufacturers are able to control it completely, and that is why they choose foreign direct investment to do it. So, the best way to build an infrastructure with a worldwide spreading is FDI. Also, another thing has to be underlined.

Tesla also controls SolarCity that provides solar pure energy to charging stations, making it more convenient for Tesla to have a charging network and potentially more profitable. Moreover, many incumbents in the automotive industry are not planning to build their own network but are projecting electric cars. They will need to access a network, because customers are not willing to wait several hours or to use public stations that are not widespread and difficult to find in many countries, as already said. Indeed, they would not have any incentive in building their own new network when Tesla, the owner of the main one, is ready to open the doors of its one to them, sharing only the maintenance costs. However, the real reason why Tesla should find partners can be found analysing their balance sheet. Probably, it will not be feasible for Tesla to continue expanding its network. First of all, Tesla has one of the least leveraged balance sheets in the market, around 32.5 %. Moreover, Tesla as a very high coverage of its current liabilities, with a current ratio of 1.125.

In addition, Tesla has not generated any stable positive and meaningful level of net income in the past years. That is linked to the fact that the company is aggressively investing. However, the real problem is that the company burns cash at a level that can impede it to see the end of the calendar year. The company burns USD 7,430 every minute and its FCF is incredibly negative since six quarters, how can be seen in Exhibit 1. It is clear that it would need to be financed additionally in order to build new charging stations, in particular considering what has been stated before, that it should spend USD 1.9 – 7.5 Billion to let electric vehicles reach the convenience of gas ones, building 30,000 new charging stations only in the USA.

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