Technology Fundamentals for Business

From Pipeline to Platform

TESLA

Group F
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1 - Problem & Opportunity

Situation: An Imperfect Transportation World

The world is in need of a transportation overhaul. On the one hand, many regions lack public transport infrastructure, making them heavily reliant on cars. On the other hand, more urban and modern parts of the world rely on cars as a primary method of transportation due to a range of reasons, such as personal comfort.

This has several implications. First, cars are highly underutilized. It is estimated that a car is on average only used 3% of the time, while 97% of the time they are sitting idle and occupying space either on streets or in garages[1]. Second, cars have a very low transportation density, with average occupancy of around 1.5 people per vehicle, despite often having as many as five seats[2]. Third, despite their technical flaws, cars are the main transport method in many countries. For example, 86% of commuters in the US use a car[3]; meaning much of the infrastructure in the world is designed and built for cars, having huge parking spaces, and multi-lane roads.

These factors have led to large societal impacts, such as inequality arising from not owning a car, poorly designed urban centers, increased risk of road accidents; and not to mention the large impact on the climate because of their CO_2 emissions.

Transportation - The Space Race of the 21st Century

For many companies, however, this is a huge opportunity. Whoever can find a way to more effectively utilize the immense resources and potential of cars might hold the keys to the future of transportation. Different organizations are taking different paths to win this race.

Companies, such as Uber, Cabify, or Lyft have opted to take the human-based ridesharing route, where any car owner could potentially become a ‘taxi driver’ for other users. Other companies, such as Volkswagen, Mercedes-Benz, and BMW are exploring the subscription route, where users can rent a car for punctual trips, rather than having to own the car itself; relieving them of that unnecessary financial burden.

However, the race that companies are most focused on is that of the Autonomous Vehicle (AV); and by manufacturing and launching fully autonomous cars, they will be able to almost effectively remove the human factor from the equation.

Transportation as a Platform

For the purposes of this paper, we are assuming that the advent of autonomous vehicles is a fact, rather than a possibility. We believe that this technology will be widespread in a matter of decades. However, the race will not be won by a car company simply launching an AV; but rather by those that manage to successfully build a holistic platform around their AV technology. This notion of a platform will be the focus of this paper.

Tesla - The Perfect Contender

We believe that Tesla has the ideal combination of existing elements in their business to successfully launch such a platform. Tesla already has a great technical backbone by being well established in the cloud and utilizing the newest tech stacks. We believe that their current architectural situation as well as their holistic ecosystem (e.g. vertical integration into the energy sector with SolarCity, development of AV technology) is the key factor that makes Tesla the prime

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[1] Forbes. 2021. “The Future of Autonomous Vehicles: Product or Services?”. Link here

[2] Center for Sustainable Systems, University of Michigan. 2021. "Personal Transportation Factsheet." Link here

[3] Statista. 2019. “Global Consumer Survey”. Link here

candidate to build a platform that manages all aspects of autonomous fleet management: manufacturing and maintenance, AV tech & infrastructure, and ride planning. For Tesla, this business transformation is less about adopting a specific new technology, and more about effectively combining several elements in new ways.

2 - Business Model Impact & Technology

Business Model Change

Tesla has the potential to fundamentally disrupt the car manufacturing business model. Instead of it being the owner of a pipeline in the value chain - spanning from car manufacturing and sales to infrequent maintenance - Tesla would now become a holistic platform, with autonomous transportation at its heart. By enabling car owners to open their cars to others looking for transportation, Tesla creates an entirely new value stream in which the car becomes a revenue-generating and service-providing asset - rather than an underutilized and inefficient one. In that sense, Tesla would be disruptive across multiple categories.

First, it would be disrupting the market by “uberizing” their cars - essentially bringing underutilized resources as new supply for the market by enabling owners to open their cars up for other users to use for rides. Second, Tesla would also be servicizing the cars by equipping them with specifically-placed IoT sensors in order to closely monitor the car’s health and provide immediate and automated maintenance when needed. This adds an additional layer to the cars as service-providing assets. Third, this new platform model would enable Tesla to control a completely new channel of communication with customers, namely those that do not directly own a car but still use the ride-providing platform. This would have the benefit of creating a positive feedback loop where ride users eventually become direct customers by buying and renting out their own cars.

How Technology Contributes

As discussed, Tesla already has many technological bases covered, such as AI for self-driving cars, sensor technology, and cloud infrastructure for data collection. However, the big innovation of this new model is not achieved through the addition of individual specific technologies. Rather, this model works when all technological elements are combined and applied in one platform - the whole making it greater than the sum of its parts. To this point, we see three primary technological pillars that will be necessary:

1. **Artificial Intelligence and 5G Networks:** These two technologies will be critical in enabling the proper functioning of the platform, as well as the autonomous vehicles themselves. AI for self-driving cars will enable AVs to predict subsequent actions and make responsible driving decisions. Furthermore AI will also enable effective customer-to-ride matching, and calculating which route is most efficient. Without 5G, on the other hand, latency will be too high to enable true, seamless, and safe driving.

2. **Edge Computing and IoT:** Cars equipped with IoT sensors will enable Tesla to monitor car health more closely. This will be especially important for the platform system, as cars will be utilized at a higher rate than before - hence needing more frequent maintenance. However, having connected sensors that provide virtually continuous data feeds will lead to an explosion in the amount of data to process. Transmitting, processing and responding to the data via centralized data centers will be highly inefficient, not to mention extremely costly in terms of resources. Rather, these cars will need to be edge-computing ready. Meaning they will need to be able to perform certain basic data processing tasks - such as self-diagnoses and analytics - to reduce the amount of data needing to flow to central servers.

3. **Cloud Computing:** Will be a must for all aspects of the platform, and especially important when it comes to the management of the ride-sharing feature, for aspects such as demand and supply forecasting, dynamic pricing, and fleet management, amongst others.

4. **Peer-to-Peer Payment Systems (Optional):** By enabling cars to perform certain base computing tasks, we also open up the possibility for the car to act as a node in a P2P system and be associated with smart contracts for payment, incident or insurance management.

3 - Impact on Stakeholders

While the journey towards autonomous cars is driven by manufacturers and slowed down by regulators, the need to better utilize cars through a platform comes mainly from the manufacturer and its customers. Car manufacturers, including Tesla, face the problem that once AVs are deployed, they will reduce the general demand for vehicles and therefore companies will be in need of new sources of growth[4]. From the customer perspective, the trend away from ownership to access is the driving factor for change. This trend, which has already hit many markets, is also well known in the car industry (eg. leasing and car sharing) and will intensify over time. A platform to distribute utilization of the latter is the logical next step.

Although all Tesla stakeholders will be affected by this transformation, this section will focus on the customer, and the impact on society will be covered in chapter 4. Currently, Tesla's customers are people who buy one of their vehicles; and by introducing the new platform model, Tesla will be able to interact with three different kinds of customers.

The first customer group is the one Tesla is already familiar with: people who simply want to buy a car for themselves. These customers, although choosing to not participate in the platform, will benefit from improved predictive maintenance of the car. In addition, it will be easier for them to share their car with family and friends. This is the customer group that will be impacted the least.

The second group of customers are Tesla owners who want to make their car available on the platform. By participating as a lessor they can generate a passive income stream, making the purchase of their vehicle more affordable and profitable. For example, if they are at work or driving to the airport, instead of parking the car (and paying for parking) and leaving it underutilized, the car will generate income by providing rides to other users. To incentivize this group, Tesla will need to provide excellent insurance as well as proactive customer service in case accidents or incidents occur.

Finally, the third group are the users of the ride-providing platform. This new group will become important stakeholders for Tesla as they generate new kinds of revenue. This group will be the most impacted and will have the biggest effect on Tesla itself. For them a car is no longer a simple functional asset to own, but rather a mobility option they want to use. This means that Tesla will need to orient themselves to meet these new customer demands. For example, new customers will value features that impact the travel experience more than the actual physical structure of the car itself, such as: design over robustness, in-car experience over driving comfort, efficient route selection, and more. Tesla seems to have already understood this movement and is on its way to position itself comparable to an Apple of cars rather than the Samsung of cars.

While autonomous vehicles will already have an indisputable impact on mobility, a platform to improve their utilization will fundamentally change the relationship between people and cars. To be a winner in this market transformation, Tesla will need to manage new relationships with all their customer groups.

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[4] Data Nation Germany, Deloitte. 2019. "Urban Mobility and Autonomous Driving in 2035: How robotaxis will affect cities and automakers" (Thesis #4). Link here

4 - Impact on Society

As seen, technology will fundamentally change car use and ownership, which will have significant implications for how cars are used both individually and collectively. Additionally, it will also shift how mobility is organized and how our environment is engineered for humans rather than cars.

The nature of autonomous vehicles already tackles most societal needs, such as increased safety, newfound free time while commuting, personalisation of transportation, and an impact on urban planning. Above all, with less demand for parking, cities can be designed to be more people-friendly, with more space and green areas.

However, we believe that the largest impact this platform will have is on making mobility more accessible and democratic. Currently, cost and accessibility are most people's decisive factors when choosing transportation. Cars have a high entry barrier in both, needing high upfront investment for the vehicle itself and a driver's license or otherwise depending on costly taxi rides.

With autonomous vehicles, customers are firstmost not in the need of a driver's licence anymore. This means everyone can access this kind of mobility, from children to elders, to people with physical or mental boundaries. Furthermore, through the easy to use interfaces of the Tesla platform, an owner's car can instantly be made available to pick-up the people we care for. This means accessibility of individual transport increases

Furthermore, the cost of owning or using a Tesla is drastically reduced, making it again more accessible for a wider audience. As a Tesla lessor, the costs are reduced through the income generated by renting the car out via the platform, therefore maximizing its utilization. For customers utilizing the platform, the decreased price is based on fixed costs being shared (e.g. insurance, taxes, maintenance), shared rides if desired, no parking costs, and no human labour. For example, Deloitte has estimated that a diesel AV will cost around 15ct per kilometer[5]. When taking an average German commuting distance of 17km, this is less than the price of a public transport ticket.

In addition to increasing accessibility, the platform enables for faster innovation penetration. Cars that have a higher utilization will also need to be replaced more often. Currently, the average age of all registered cars in Europe is 11.5 years, implying that this is the time it needs for new features to be fully present. Having a quicker turn-over of cars will help ensure that new security features that are not just over-the-internet software updates, but also physical improvements, reach a wider audience quicker.

The platform also enables for a more efficient use of resources, which now become shared. Currently, cars are parked for 97% of the time. With the Tesla platform, cars can be used more efficiently and are able to drive themselves to the next customer. This will lead to a reduction in the number of cars needed, which will lead to less resources needed for manufacturing, less space needed for parking and less emissions.

To conclude, by combining all technological assets, Tesla could position themselves as a provider of transport. Instead of being a pipeline in the value chain, it will become a holistic platform with autonomous transportation at its heart. Their applied experience in AI, cloud-computing and IoT are the assets that need to be united to have a drastic impact on how society experiences mobility. All technological pillars are important, but the whole will be greater than the sum of its parts. Expanding the customer base by fulfilling new needs will open the door to democratizing mobility and changing cities for the better. *

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[5] Data Nation Germany, Deloitte. 2019. "Urban Mobility and Autonomous Driving in 2035: How robotaxis will affect cities and automakers" (Thesis #2). Link here

* Fun fact: The initial summary for this conclusion was generated for us using ML (NLP) by GPT-3. **It's incredible.**

5 - Sources

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