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Battle II - Report

FCA vs Tesla

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1 Introduction

Innovation can be undeniably seen as engine which allows the world to progress and enhance our living conditions, but when it comes to business, having innovative ideas isn't always enough to reach and maintain success.

Douglas Hofstadter once said that we are "strange loops"; behind this assertion there are many interpretations, but surely enough one lies under the fact that we are continuously trying to ask ourselves the same questions again and again, sometimes concluding to not have a complete, precise idea of what the answers could be.

As many entrepreneurs did during the centuries, we asked ourselves which are the keys to manage and integrate innovation in the business world. In order to better understand the nature of such "ingredients", we tried to highlight some questions which could led us to a hopeful enlightenment. At a first glance, there were quite a few questions that pounded our minds, for instance: are we always prepared to confront us, giving the rapid advancement in technology, with rapid integration of innovation in our lifestyle? Or we should prefer a more slow-paced, reflective and time-tested approach? Is innovation -at least sometimes- creating more problems than solutions? How we should react to unpredictable (and unwanted) effects that some kind of innovation can lead to, giving that the innovation itself brings several benefits?

Of course trying to answer to all this questions is a fairly hard investigation, and even after a statistically sound analysis we could not have clear ideas about their answers. By the way, as a matter of fact, we will use these interrogatives as guidelines to have a better grasp of why innovation itself isn't merely sufficient to conduct a winning business.

In this work we present a case study where we compare two distinct business models; in particular, we restrict our focus on the automotive world, considering two eminent companies: Fiat Chrysler Automobiles (from now on simply "FCA") and Tesla Automobiles (hence forth called "Tesla"). The first one is representative of a more conservative car manufacturer, which integrates innovations and technologies in a slow and more financially sustainable manner, investing mainly in short or mid-term solutions, such as gas and hybrid technologies; on the other side, Tesla brings the flag among those companies which are on the bleeding edge when it comes down to innovation, pursuing the realization of fully electrical vehicles, as well as enhancing self-driving development.

The comparison will face heterogeneous, selected aspects, detailedly pointed out in the next section, "Scenario"; nonetheless, such points are directly tied to the actual technological issues that each company is trying to solve, so we can consider the comparison itself mainly of technological nature.

2 Scenario

As for all the "battles" of the IBICT course, the comparison was carried out by two teams, one taking the side of FCA, the opponent impersonating Tesla Automotors. The playground for the battle was prepared assuming that an audience of investors were willing to invest in one of the two companies selected, where each team had the role to convince the audience itself about the presumed superiority of a company in respect to the other. Investors are generally interested in risk levels, past performances, future projections and obviously profitable margins: as a result, the comparison have been imprinted on focal points directly related to such aspects. At a first glance was necessary to explain the technology stack that each company is pushing as its working flag: that means looking side by side two considerably different parties, where the first's concerns is to improve the existing and well-tested driving models (FCA), the other focusing on bleeding-edge innovations, with fully-electrical ignition and self-driving algorithms on the forefront of the production line. Once understood the technical background of the competitors, it is also meaningful to discuss about the business model built upon the marketing of such technologies, the vision behind their wide-spreading and the growth that they promise, as well as some collateral topics, such as maintenance services, environmental sustainability and driving safety and security. Of course there are many other significant comparison points to talk about; nonetheless, we considered at unanimity the ones above to be essential in order to allow an investor to choose which company deserves to be financially supported. Just to cite a prominent example between the excluded topics, leadership and CEO has been decided to be cut out from the discussion since Elon Musk has been recently accused of fraudolent activity; giving that both FCA and Tesla are far away from being one-man companies, is logically understandable that, in order to maintain a certain level of fairness during the debate, it's mandatory to avoid subjects that can potentially be "slippery" for one team and a kill switch for the other.

3 Fiat Chrysler Automobiles

3.1 Business Model

The two holding companies for automobiles production, Fiat and Chrysler Groups, became a multi-national organization when they merged in early 2014 [26]. With business coverage spread over 140 countries, an employment of nearly 236,000 people, this strategic fusion lead FCA (i.e. "Fiat Chrysler Automobiles") to be one of the biggest automotive manufacturers in the whole planet. The FCA group now has control over the whole chain of production and services, including design, engineering, manufacturing, vehicles and spare components sales, and provision of a multitude of services [27]. The business operativity is active worldwide through the 87 research and development centres, 159 manufacturing facilities, as well as a multitude of dealers and distributors. The production of technology has been driven by the sub-brand Magneti Marelli, which has provided FCA with the opportunity of having consistent and innovative development of vehicle components and low dependency from third party supplies [29]. Other businesses within the FCA group further contribute to the complete control of the vehicle production, including Comau for the development of production systems and sub-brand for iron and castings, Teksid [27].

Mopar is also an integral part of the FCA group, previously being a part of Chrysler Corporation. Mopar, whose name stands for "MOtor PARts",finds its target on offering quality accessories and aftermarket parts for FCA vehicles as well as maintenance services for owners [30]. Being FCA focused on production efficiency, the choice to have a dedicated sub-brand in order to provide this kind of services is not unexpected. The first and most obvious advantages are the working focus and the tasks management that, being it handled in a centralized way, is crucially improved in how efficiently it is carried out. Furthermore, the guaranteed compatibility of replacing components is something that no other aftermarket company can provide [30]. Finally, the services provided to owners, such as vehicle protection plans, roadside assistance and express care should ensure that the vehicle is safe and in perfect order. These efforts are signs that FCA is striving to create standardization, quality and services that are close to the customer and make use of FCA's high presence in worlwide markets.

The latter aspect probably is, in fact, one of the most prominent FCA marketing strategies: currently, the company delivers vehicles to customers through the brands Abarth, Alfa Romeo, Chrysler, Dodge, Fiat, Fiat Professional, Jeep, Lancia, Ram and Maserati [27]. Within this portfolio of brands, FCA can offer a wide variety of vehicles in a number of different segments. This includes passenger cars ranging from the A-segment (i.e. city cars), where FCA has a history of successes, such as the Fiat Panda and the Fiat 500, all the way up to luxury F-segment cars, such as the Maserati Quattroporte, but also sport utility vagons where Jeep is a well known player, multi-purpose vehicles with the Dodge Caravan as an example, the pickup-truck dedicated brand Ram, labour vehicles such as Fiat Fiorino and Alfa Romeo or Maserati when it comes down to racing vocations. The choice to maintain a high level of diversity in the production

regime ensures a better penetration in different demographic and geographic zones; this strategy also allows to keep revenues at a constant level throughout the year, making marketing predictions much more accurate and realistic [4].

3.2 Strategic growth and vision

Is not a secret that the two main groups that compose FCA have had hard times during the decade 2000-2010. Since then, FCA operational directives were strategically focused upon a completely new, fully (economically) sustainable approach. Most of this changes were applied by the former company CEO Sergio Marchionne [5], who has restrengthened the Fiat brand by merging with Chrysler, optimizing resources and processes, exiting low-revenue markets and rearranging the personnel structure, improving teaming and cooperation [4]. Financially speaking, the results of such complete overhaul have been impressive: FCA was transformed from a almost zero growth company into one of the biggest giants in the automotive industry in less than ten years, leading to a staggering increase in company revenues: in 2017 alone, net revenues almost doubled the preceding year. [5][32].

The report of the business plan from June 2018 gives an indication of the strategy for the company the following four years up until 2022.The report itself is a clear indicator of how the company is targeting production efficiency in order to not only improve revenues, but also to tackle the environmental and technological aspects [25]. The key that allowed to massively raise profits and, at the same time, to advance in both these fields, is called "World Class Manufacturing" (WCM). The WCM is a framework of methodologies inspired by the Japanese lean production philosophy [28], has allowed to double the revenues in the past years (as already stated above) and will permit to further increment them in the upcoming ones. The reasons why the WCM has been and will be so successful can be found in two simple words: sustanaibility and manageability. Within the optics of the WCM, a working team face every decision is going to take (maintanance, logistic, quality assurance, safety, management, ...) on the basis of their economical incidence. The team activity is oriented toward the accomplishment of small, focused projects (Kaizen) whose objectives are "zero defects, zero faults, zero incidents, zero remaining stocks": in other words, the final target, which is a consistent reduction of the production plant costs, is ensured by the autonomy of the team itself (that's why decisions are "manageable"), using parameters that are always taking into account the economical aspect (and thus "sustainable").

Speaking about near term technological investments, the current business plan introduces a forecast regarding the electrification of vehicles within the FCA group. In the last years, FCA has displayed skepticism regarding the electric cars [23], but for the upcoming years, substantial investments in the sector will allow to introduce the proper technology with the aim to provide FCA a place between the electrical automotive leaders in the world [25]. Because electrical ignition has several open issues on its side, where battery production and disposal are questionably only two of the most dangerous ecological problem

nowadays, FCA has preferred a more conservative approach towards such innovation. The current marketing strategy [25] seems to dictate a phase of analysis and careful observation, where the company itself is both undertaking plenty of research and at the same time managing to interweave strategical partnership (such that with Waymo in recent times [31]) in order to gain control over innovations that have already gained an acceptable level of maturity.

3.3 Safety & Security

FCA takes safety very seriously, not only by a mere research point of view, but also when it comes down to liability. An outstanding example which justifies the latter assert comes from a recent event, where almost 5 millions vehicles have been subject to recall procedure due to a defect on the cruise control subsystem [14]. Although the issue can be considered of minor impact (since it affects only vehicles with more than 200'000 km, and the problem itself can occur in 'extremely rare circumstances', as stated by FCA itself), FCA opted to a full recall, even if it would imply significant expenses. Engineering issues can always happen, but these are the circumstances that highlight the reliability of a company, and where a quality service comes into play. Safety, security, and in general terms, reliability are such primary concerns of FCA that a constant research is fullfilled in order to provide the bleeding-edge technology against threats or damages. Notorius recent examples are the Rear Cross Traffic Assist (RCTS) [24], which is helpful in blind driveways, the ArcelorMittal's latest Fortiform® alloy used in vehicles floors, which drastically reduces the costs, but also ensures higher torsion performances and reduces consumptions, due to the overall more lightweight structure [3]. Is also worth consider that safety and security are also tested by standard procedures, like crash tests, and lately FCA has exceedeed the 20'000 crash test from 1961 to today [15]. This milestone represents more than 50 years of activity where FCA has joined a diverse range of technical skills and standardized methods in order to achieve safety level thant were once unthinkable. The excellence of results is also confirmed by the numerous quality awards conferred by independent third-party organizations, such as the Chrysler Pacifica recognition as "Top Safety Pick" by IIHS [10], which is one of the latest and most significant achievements.

3.4 Self-driving technologies

FCA started a strategic partnership with the self-driving car service Waymo, belonging under the Alphabet umbrella, since May 2016. The CEO at the time Sergio Marchionne commented: "Strategic partnerships, such as the one we have with Waymo, will help to drive innovative technology to the forefront. [...] FCA is committed to bringing self-driving technology to our customers in a manner that is safe, efficient and realistic". Those words entirely reflect the approach that FCA maintains to bring fresh new, qualitative technology into the automotive market. A first achievement in this sector has been the production of 62,000 Chrysler hybrid minivans to be deploy over the self-driving car service Waymo

(FCAW); moreover, the Waymo partnership is not the sole one: in 2016, an agreement between FCA and Google establishes a cooperation to develop a new generation of autonomous vehicles [12] that will be ready for the market by the end of the decade. These collaborations are clearly representatives of the company's serious intentions to become a leader in this rather new driving paradigm [31]. With these cooperation, FCA aims to develop new forms of technologies that will enhance self-driving management tools, but also to acquire knowledge of possible new unexpected applications where autonomous vehicles could be suddenly employed. It's worth noting that the self-driving phenomena has not only technological concerns, but also social ones: since nowadays cars are parked 95% of the time [8], self-driving cars could be a better option compared to conventional cars, meaning that a fewer number of cars can fulfill the requirements of an higher amount of customers. It has to be considered the reduced stress factor too, since driver would not be exposed to the parking stress attitude, nowadays so commonly spread out in crowded commercial zones. The results can be easily drawn: even if less cars will be built and sold, companies can raise the price of the single unit in order to guarantee more quality and way more tested features. Fewer cars and more quality would means less pollution and much more satisfied customers, so, a win-win for both the producer and the consumer categories. Although this situation could be considered a radical change, Waymo is one of the few that is prone to accept the risks, due to the experimental nature of habits conversion itself; FCA is aware of such controversial aspects too, but, nonetheless, is still ready to welcome every possible outcome as Waymo is, since the collaboration keeps going on strongly, having it been recently renewed[13].

3.5 Environmental Sustainability

FCA has always been aware of the fact that petrol engines cars are one of main cause of environmental pollution, between many others. Being the ignition mechanisms the root of the problem itself, it's clear that it represents the starting point for a research of more ecologically sustainable solutions. The first pivotal result came with, LPG gas based engines, almost 30 years ago, and since the launch of the first LPG vehicle, FCA is still one of the biggest producer of natural gas vehicles in the world [**?**]. Nowadays LPG gas usage is considered more a short term solution, rather than a definitive one, and there are many reasons behind such perspective. The rationale is than LPG gas is not a renewable resource and, although not harmful as conventional petrol -as a combustible-, is still a not-towards-zero pollution method of ignition. As a result, FCA is experimenting different approaches, where the most significant one are electrical engines; although electricity can still questionably be considered not mature enough for a mass scale adoption, FCA has undergone some attempts to reach the market, as showed by the launch of five new completely electric Maserati models [**?**]. The reasons behind considering electricity a final solution to the automotive pollution problem is underlying the fact that most of it is produced from non-renewable sources, which virtually doesn't add any

benefit from an ecological standpoint. Another equally critical aspect is that environmental pollution problem doesn't involve only the automotive companies, but also the customers: for instance, the three most sold vehicles in the US are all pickup trucks [**?**]. This is due to the relatively low price of the vehicles in this category, and the almost unbeatable price of the required gasoline. These aspects, together with reliability and versatility concerns, are making customers much more prone to buy a pick-up rather than a smaller, greener car. Given the complex nature of the problem, which intuitively has many fading shadows under its amplitude, FCA is trying to properly tackle the necessity of a sustainable transportation still pushing LPG technology for the upcoming years, but evaluating a diversified range of alternatives, heavily investing on the research of solutions which can fulfill the purpose, also if they appear immature at the present moment. Conducting a successful business is not a mere process of introducing innovative ideas and technologies, but also to spot the right time when a certain solution has reached enough maturity to be effectively posed on the market. Exploiting this adequate level of maturity, consensus can be gained through mediatic momentum and therefore revenues will be automatically triggered. FCA knows it, and that's the actual motivation behind the conservative position about electric vehicles and their spreading as today.

3.6 Maintenance

A good brand does not only sells a quality product, but also has care of the services to provide in order to let the product itself gain an additional value. In the automotive world, maintenance is often a crucial part of the whole picture, much more than many other sectors. FCA has a unique approach to maintenance services, bringing a centralized organism whose name is "Mopar". As already said, Mopar stands for "MOtor PARts", and has more than 80 years of history behind his back. Mopar provides assistance and replaceable parts for every FCA vehicle, and the only, specific commitment that this organism has is to furnish components that fit perfectly, guaranteeing availability, reliability and fast response times. Having a unified entity that takes care of the plethora of maintenance services has several positive outcomes. First of all, knowledge and expertise can be managed in a more straightforward way, leading to working teams more homogeneously distributed in competences, and overall, able to inter-cooperate easily. Second, this choice fully integrates with the main whole business model that FCA conducts through the WCM, thus showing the benefits that the latter provides in the most effective way. Third, the marketing and technical sectors within Mopar can communicate with more practical and collaborative methods, since Mopar acts as it would be a detached company, managing its own personnel and working for its own profit [**?**]. In our opinion, given these concerns, Mopar has few competitors that can reach the same professionality level in its own realm.

4 Tesla Motors

4.1 Business Model

Tesla's founder and CEO Elon Musk launched the company with the mission of "accelerating the advent of sustainable transport, bringing electric cars en masse into the market as soon as possible." This sentence perfectly describes the big business model Tesla success. Back in 2008, with the delivery of the first full electrical car named Roadster, Tesla entered the Electric Vehicles market, which probably was one of the less explored at that time. Nowadays, this company is able to exploit this market mainly because of its philosophy. In fact, Tesla Motors started developing its own cutting edge technology from the single battery cell to the engine gearbox, letting the company to rely on its own intellectual properties to build cars that shows incredible performances, not only in term of speed, but also in terms of battery degradation and range covered on a charge, showing to customers that this technology could be the future. It is important to note that, since all the Tesla's intellectual properties are open source, every car manufacturer can further use and improve this technology. Part of the Tesla's business plan consists of the so-called "Masterplan" [21], used by the CEO Elon Musk to define the company's strategy. As a first step, the company entered the market with high-end expensive cars to attract a relatively restricted circle of well-off customers (for example the Roadster was sold at 120'000$ from the 2008 until the 2012). The second step consisted to release more affordable models, always respecting the high quality standard in terms of innovation; one prominent example is the Model S, available from 2012 and priced 65'000$. In order to reach more customers, in 2017 the Model 3 was released starting at 35'000$ and this represents the final step of the "Masterplan": being the price much affordable than preceeding models, Model 3 can clearly drastically broaden the market. Along this selling strategy, the Business Model is composed by two other focal points. In fact, the company provides a large and well developed network of charging point, the so-called "supercharging network", which is very appreciated by the customers mainly because the company gives to them some free charges every year but also because it is ten time faster, i.e. about an hour, than charging the car at home. Furthermore, one of the fundamental component of Tesla's business consists of the servicing facilities. Indeed, the presence of various centers all around the world permits the customers to request and buy repairs; moreover, newer models can be inspected remotely and specialized technicians can do maintenance directly at customers' house.

4.2 Growth & Vision

Since Tesla's birth, its first goal was to incentivize the sustainable transport through a constant work aimed to create and refine the technology required to electric cars. Nonetheless, they are not only developing automobiles, indeed, in 2017 the company teased a new vehicle called Tesla Semi, which is an autonomous full electric truck with, as not fuel-powered vehicle, good recharge

time and autonomy performances (around 800 kilometers). Furthermore, it boasts an energy consumption of less than 2 KWH per mile, which attracts the attention of many customers, interested in transport cost reduction. In fact, Semi, whose production should start in 2019, received pre-orders from various delivery companies. Moreover, the business of the company opened also to the house field with the presentation of the Tesla Powerwall [22], which is a big modular battery that can be installed at home and allows the storage of electrical energy produced by solar panels. Furthermore, on October 26th 2016, the CEO Musk announced a new product called "Tesla Roof Tiles" which consists of a root tile that can transfer the solar energy, through the means of electric energy, into an integrated Powerwall battery, providing it at any time. The continuous growth of Tesla can be proved starting from its foundation in 2008, when the company was worth 14,7 million dollars. In fact, its value grew up to 111,9 million the following year with a 661% surge. Successively, in 2010, Tesla went public with an initial public offering (IPO) of about 13,3 millions of shares at 17$ each. Since then, the average value went up reaching about 360$ per share at the beginning of December 2018, with a growth of around 2017% in almost 8 years [9]. In conclusion, the continuous development of electric batteries permits Tesla to broaden its views and try to become a good competitor in different markets, including, for example, the sustainable energy supply.

4.3 Safety

Safety and security have always been focal points of research within Tesla. Just to name few self-speaking results, every Tesla model released on the market has reached at least a 5 star rating out of 5 in the EuroNCap crash test, with the Model S, Model X and Model 3 outclassing the standard rating scale achieving an outstanding 5.4 out of 5 rating [17]. By NHTSA standards (National Highway Traffic Safety Administration, the american agency monitoring safety measures in automotive trasportations) all Tesla cars set a new record in terms of safety -having the lowest probability of injury-, outclassing even recent Volvo cars, which historically have been leaders in the sector. For example, when compared to the Volvo S60, Tesla Model S preserved 63.5% of driver residual space against the 7.8% of the Volvo counterpart which, among other things, uses one of the most innovative solutions available (similar in characteristic to the one employed in the Apollo Lunar Lander) [17]. Furthermore, electric vehicles are safer and more reliable by construction, since there is a drastic reduction in the number of moving and vibrating parts. Thus, their maintenance is greatly simplified, and also considerably cheaper [1]. Many concerns have been arose around the battery, since it's considered the most critical part in the entire vehicle structure: Tesla, in order to guarantee the highest level of safety possible, implements state-of-art technologies against overheating or burning danger. To better clarify how much the company cares in matter of safety and security, it's known that it has instructed firefighters to deal with a burning Tesla car [19]. Some innovations introduced in recent models allow to shift the car in autopilot mode whenever the board computer identifies some kind of danger,

whether -for instance- the driver falls asleep or faints. It's worth spending a brief commentary on the weaknesses of Tesla vehicles regarding advanced digital assets at their disposal. Cybersecurity, within the automotive world, is a pretty novel topic, and, although rather intuitively crucial, is not always taken seriously by vendors. On the contrary, Tesla was one of the first among all that has decided to adhere to severe guidelines of conduct in order to reduce the number of exploitable vulnerabilities; has also funded numerous campaigns to reward anyone who finds a new weakness in the digital systems adopted [**?**].

4.4 Self-Driving

Tesla is arguably the absolute leader in self-driving technology. Its "Autopilot" toolset, now at the 9th version, is the most trusted self-driving system around [2]. Standing on official declarations, this system allows to reach a full, driverless, control of the vehicle, but, because of the limited time spent in testing, it is classified only as a "drive assistant", thus still relying on the presence of a physical driver [18]. The nature of the driverless paradigm is quite a complex issue. As reported in [6], as of 2018 consumers are excited by the self-driving phenomenon, but also distrustful in its sudden adoption. Moreover, it shows that people generally prefer control over automation, and would be quite reluctant to get in an autonomous car [6]. Although this situation seems to pose Tesla in a disadvantageous position, it is also true that is allowing the company to have the required time to deepen and extend the safety tests, thus gaining an increasing level of trust from the market, as well as social consensus.

4.5 Environmental Sustainability

Few people know that Tesla has been founded by pioneers such as Martin Eberhard and Marc Tarpenning because they wanted to avoid the disposal of electric cars produced by General Motors, back in 2003. [11] This simple "recycle" purpose was further transformed into a visionary target: *"accelerate the world's transition to sustainable energy through increasingly affordable electric vehicles and energy products"*, as showed by the official Tesla site [1].

The project of environmental sustainability starts right from the factories, or Giga-factories as Tesla loves to call them. These facilities are designed to be fully powered using renewable energy; moreover, the production processes are highly optimized to harness the most modern energy conservation techniques, as well as less manual intervention as possible. In this way the overall result is the most effectively achievable with nowadays instruments. These two factories are located one near Sparks, Nevada and one in Buffalo, New York, and are used respectively to produce lithium-ion batteries and solar panels; another one will be built in Shangai, China. Tesla is also active in the production of renewable energy toolset, such as solar panels which the current production is demanded to the subsidiary SolarCity.

Considering that the vehicles produced by Tesla are only powered by electric energy, it is rather clear that the margin of emissions' reduction can be

fairly huge; despite this fact, another substantial problem must be taken into account: battery production and disposal. Batteries are one of the most important element within the overall fully-electric architecture of Tesla cars, so it is not possible to simply find temporary workarounds that limit the problem, but do not solve it entirely. In fact, their construction requires high quantity of greenhouse gas -a non-renewable resource-, and more environmental pollution is generated by extraction of minerals needed to properly build energy-storing cells [16].

Tesla has currently many plans to tackle such issues, and some of them are under a testing period; today, the environmental impact of Tesla batteries is mitigated by recycling batteries through the means of partner companies, with prospects to do it within the Giga-factory alone by the end of a couple of years, as the CTO Straubel said [7].

4.6 Maintenance

The motor of a Tesla car has less moving parts than the one of a fossil fuel powered one, thus greatly improving its duration and drastically reducing the possibility of a malfunction. Because of these unique characteristics, maintenance of Tesla vehicles is way easier and cheaper. A picture of a Tesla motor -which lasted for over one million miles in a test- was published on Twitter, and the exterior appearance is basically the same of brand new one[20].

A Tesla car has a 4 years (or 50000 miles) warranty, which covers repairs or replacements needed to correct defects in the materials or any part manufactured or supplied by Tesla which come with normal use. Moreover, the battery and the drive unit of the car are covered by an extended 8-year warranty, also ensuring free of charge reparation from a battery fire -if it ever occurs!-, even in the case it's the result of a driver's error [**?**].

Tesla also offers some optional maintenance plans, which cover the annual service inspections for 3 or 4 years. Although such assistance is not available worldwide, Tesla is pushing great efforts in order to broaden the covered areas.

For any problem with their car, accidental or not, Tesla offers service centers placed all over the world, with their number in continuous expansion; it's also possible to book overhauls directly from the onboard computer. A more convenient alternative is also available: if required (especially in zones far away from the nearest center), an expert technician can be sent over to the customer's house and carry out the needed operations right on the place.

5 Reconciliation

The battle allowed us to face a direct comparison among two fundamentally different companies. It is clear that one of them, namely FCA, has a more "conservative" approach on how to manage business; on the other hand, Tesla, being at an early stage of evolution, has a way more aggressive attitude towards the business directives. Let's analyze in detail how we can reconciliate the just depicted realities. Tesla vision is arguably more socially approvable, since the main idea is to definitely solve the problem sustainable transportation; FCA vision is also clear, but in our opinion is more investor-friendly: the strategic choice to employ great amount of resources in short-term solutions can lead to faster and more prominent market approval, thus resulting in higher profits. Having future-proof research directives is also crucial, but even more so is how such research is carried out: FCA approach makes use of many cooperations with a distinct range of partners, Tesla prefers to develop its own solution in-house; from our point of view, since both of them have their downsides, the best approach would be to maintain a right amount of high-potential projects private, especially the ones that are seen as more promising, and a fairly good quantity of collaborations with external partnerships, thus enabling the possibility to gain the market share which is already targeted by the partner company itself. Taking the self-driving technology as an example, is evident that FCA is not even close to develop something comparable to Tesla's, despite the double partnership with Waymo and Google; such efforts, when compared to what Tesla is investing in order to create next generation systems, could appear limited, or even inappropriate. We think that it is not the case. The rationale behind that can be found in *what* the respective companies are currently investing on: FCA, during the last 10 years has undergone some dramatic changes in its internal structure, strictly focusing on making the whole production process more efficient and, at the same time, less expensive. The World Class Manufacturing is employed to make loss more mathematically predictable, thus the margin profits can be estimated in a more accurate fashion when compare to a company that has considerable expenses due to the engineering aspects of innovations. We think that a company like FCA could fit a brand new technology in its own production arsenal in less time and with minor effort when compared to something like Tesla, since the latter does not have at its disposal the necessary structure to do the same. Balancing how much is required to invest in technology research and how, on the other side, is going to be used for business integration its a focal point to conduct a successful business. Because Tesla produces most of its technology directly in house, business integration is not a main concern as today, but could become so in the upcoming years. The intention to bring the recycling process within the Giga-factory is one distinct factor on how much financial pressure the company is now facing, probably because the expenditure for processes like research and testing is so ingent that there is no way other than trying to minimize the usage of external entities. Given the above reflections, an investor could easily judge the potential growth of a company based on the FCA model as "promisingly constant, slightly varying in the amount of profit it

will bring over time"; on the contrary, Tesla's paradigm of doing business can be recognized as riskier, but also capable of much higher revenues given the major technical potential. Our final judgment sees the FCA business model still more adequate for an investment because, although it looks less promising, can be better integrated in an existing business, therefore potentially providing more occasions to create a diverse net of new investments. What about innovation to market times? We reckon that fully-electrical vehicles are the imminent future; this transient phase sees LPG-fueled vehicles in a kind of golden age, but predictions also show that their adoption will not massively increase, especially because the volatility (and unpredictability) of gas prices and the continuous improvement related to engines electrification. FCA is slowing transitioning towards electrical ignition but, as investors, we have would like to see much more solutions reaching the market by the end of the following year, and not a bunch of them just to test the ground. For what concerns safety and security, it is awkward to compare FCA to Tesla: the latter vehicles are in a much higher price range than the average FCA most sold vehicle; it is fairly understandable that a Model S has tons of sensors and features that help to create a pleasant, relaxed guide experience than, let's say, a Fiat Panda. We think that both the companies are doing well in this respect, and it is not an insult to consider this a draw, in terms of gameplay. Maintenance is completely different story: in this case the situation expose a company -Tesla- whose aim is to reduce as much as possible the necessary maintenance services against one -FCA- which strives to achieve outstanding services, betting hard on a centralized organism that takes care of all its concerns. An investor should not only understand what a customer can love about a product, but also all the surrounding aspects that make it unique: in the automotive realm, for instance, maintenance services are game changer, because are the main point that will lead a customer to become an aficionado, satisfying its need when problem arise above all. Under this perspective, FCA is doing a great job; Tesla, also consider -as already stated- its early "career", is also pushing notable efforts (for example the technician-at-home solution: in one word, brilliant).

6 Conclusions

Creating a business is as complex as keeping it going strong. Predictability and risk, technology creation and integration, strategy and cooperation: these contrasting concepts are the weights that balance a delicate mechanism. The analysis done in the reconciliation section allowed us to not consider traditional, conservative approaches to business not fashionable anymore, but it lead us to the conclusion is that there are so many variable in this beautiful equation that is nearly impossible to predict its result with too many unknowns. An innovative idea alone does not mean a success when reaching the market, as well as a refined production system that has provided glorious revenues in the past but not integrating new bleeding-edge features will certainly not last forever.

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