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Tesla: Accelerating to Market

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Abstract: Case study examining the strategic and operations decisions surrounding the launch of Model 3 sedan by Tesla, the California based manufacturer of electric vehicles. The case provides background for Tesla, the NUMMI manufacturing plant, and the firm's charismatic CEO, Elon Musk. The firm faces market strategy alternatives presented in the context of operational and financial resource constraints. Additionally, the case provides sales data tables of U.S. alternative powertrain auto industry sales, U.S. semi truck sales, and Tesla production figures to aid decision analysis.

Keywords: first mover advantage, hero worship, strategic management, electric vehicles, new product launch, channel strategy, marketing management, financial management, operations.

James was a senior marketing manager at Tesla, Inc., a California based company known for popularizing electric vehicles for affluent and tech savvy consumers, and was asked to present to the board of directors a reassessment of their marketing strategy. Tesla's marketing communications strategy largely relied upon influencers driven by their social media savvy CEO, Elon Musk. However, the position of the brand as a leader in electric vehicles was being challenged both internally and externally. While the firm had launched the Model S sedan and Model X sport utility vehicle, both vehicles were priced at the high end of the market. Internally, the move to launch a mass-market electric vehicle, the Model 3 with a range sufficient to serve as a primary vehicle, was not going smoothly. Externally, nearly every major car manufacturer had introduced an electric model or had announced models for the very near future.

James' responsibilities had largely focused on the strategy formulation and execution of opening showrooms and service centers. Additionally, James had enjoyed his tenure at Tesla and felt as though he was a part of Elon Musk's vision of transforming the transportation and energy industries to a renewable and sustainable future. James felt that he was part of a movement.

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Following several high-level marketing departures, James was summoned to offer a new perspective on the way forward and an opportunity to shine. While Elon Musk's personal brand had driven what many media outlets referred to as a "cult-like following," the rollout of the Model 3 and the announcement of the upcoming Semi truck, and similarly teasing another model widely forecasted to be named the Model Y, seemed to necessitate a pivot in their marketing strategy. James viewed this as an opportunity to advance his career and demonstrate his understanding of market strategy.

1. The Tesla Brand Shapes the Consumer

Brands are frequently used as a bridge from the fulfilled promises of the past and present to the future. However, Tesla's approach to their brand differs by using their associations to Silicon Valley, high tech design, and innovation to shape consumer perceptions. Tesla products recruit people to support a movement larger than just the product. The products are not simply high-performance electric transportation, but embody values and a lifestyle that technology is capable of solving the most intractable problems of humankind. According to Musk, "brand is just a perception, and perception will match reality over time" (Silicon Valley Business Journal, 2010). Musk's optimism inspires consumers to focus on the seemingly immediate future. A promise of an electrified, high performance, transportation and laden with high-tech gadgetry, available now. Furthermore, the next product, whatever that may be, is announced well in advance of market delivery and drives consumers to begin envisioning owning it. The steady stream of "new" product announcements supports a view that innovation is synonymous with Elon Musk and delivered through the various firms he is involved with (Tesla, SpaceX, The Boring Company, Solar City, Neuralink, and others). However, innovation and the latest tech gadgetry didn't come cheap, and Tesla's current product line, the Model S and Model X, was aimed at affluent consumers.

2. Elon Musk

Elon Musk held degrees in both economics and physics from the University of Pennsylvania (Biograhpy.com, 2018). Musk then enrolled at Stanford to study for a PhD in energy physics, but dropped out on the second day to launch ZIP2 Corporation, a company that provided online city guides. ZIP2 Corporation was sold to Compaq, in 1999, for well over $300 million. Thereafter, he launched X.com, which would go on to become PayPal. Ebay would acquire PayPal, in 2002, for 1.5 billion (Biograhpy.com, 2018).

Following the acquisition of PayPal, Musk turned his focus to the ventures that would catapult him to worldwide fame. Musk launched both SpaceX, in 2002, and joined Tesla, in 2003. Solar City was founded by Musk's cousins, but was acquired by Tesla in 2006. As Musk's notoriety grew, so did his efforts to make his investments become successful.

Elon Musk's 2013 TEDx talk illuminates his vision for Tesla and the need to transition to renewable energy (Ted.com, Feb. 2013). The talk is inspirational in that it highlights the electric powertrain vehicles of Tesla, the solar and battery storage industry, and the many other goals that Elon has set out to achieve, but has little to do with the success of the car manufacturer itself. He's creating schools, rockets, and underground transportation tunnels, in addition to merging his firm with Solar City, one of the largest solar energy firms in the world.

Musk's steady stream of product announcements and embracing large-scale pioneering projects has resulted in a base of admirers and an outsized share of voice from the press. Casual observers might be compelled to think that Musk and Tesla command a large market share and sizable profits based upon the amount of news coverage. Additionally, illustrative of Musk's cult-like status are t-shirts sold by RedBubble.com that professes, "I accept Elon Musk as my lord and savior," or "in Musk we trust." The t-shirt company offers 52 versions of similar, hero praising, Elon Musk clothing. Similarly, several other sites exist that sell 'Elon Musk' products, with many employing various forms of religious idolatry and employing phrases as though he could, "save us."

All of the praise surrounding Elon has enabled Tesla, as well as other companies affiliated with Musk, to benefit from a "halo effect." When Tesla announces something new, this also boosts Elon's personal brand. Similarly, when SpaceX has a successful launch, Elon, and Tesla by association, benefit from the positive press coverage.

3. Tesla, Inc. and the NUMMI Plant

Martin Eberhard and Marc Tarpenning founded Tesla, Inc. in 2003 in Palo Alto, California (Burns, 2018). Located in the heart of Silicon Valley, the firm benefits from association with high-tech and innovative firms of Northern California. Tesla's primary factory is located in Fremont, California, purchased during the depths of the Great Recession for just $42 million, when the facility was valued at $1.3 billion (Johnston, 2015). The Fremont Assembly plant, breaking ground in 1961 and producing autos in 1962, was owned and operated by General Motors (GM) to manufacture small cars and pickup trucks. However, the factory was known for turning out defective vehicles, so GM shut the plant in 1982. GM was eager to practice lean manufacturing techniques and Toyota, who needed to circumvent import quotas, reopened the Fremont plant as a joint venture under the New United Motor Manufacturing, Inc. (NUMMI) in 1985 (Langfitt, 2015).

Under the joint venture, the NUMMI plant production peaked at approximately 430,000 units in 2006 (DeBord, 2017). The joint venture was disbanded in 2010, when Toyota was able to shift production to facilities with lower labor costs while GM faced bankruptcy. GM sold the facility that cost more than $1 billion to construct for a mere $42 million to Tesla, while Toyota took a $50 million dollar stake in common stock (Linn, 2010).

The new Tesla production facility is the site of assembly for the Model S sedan and the Model X sport utility vehicle. While the NUMMI plant was projected to have a capacity for 500,000 units of annual production, Musk reported in 2017, that the facility was, "bursting at the seams," (Autoweek, 2010). As Tesla looks to expand their product line to include the upcoming Model 3, Mike Ramsey, an analyst with Gartner Inc. noted (Autoweek, 2017):

> While Tesla has taken a Silicon Valley approach to everything from product development timelines to sales, the decision to invest in more real estate brings it closer to its Detroit rivals.
>
> "If they're going to be a real automaker like the rest of them, they're going to have to spend billions of dollars on new plants," Ramsey said. "They're becoming less of a tech company and more of a manufacturer."
>
> To build a factory from the ground up, Tesla will have to invest more than $1 billion, in addition to developing a new vehicle in the next two years. But as long as there is demand for Tesla vehicles, Ramsey said, Musk will be able to raise that cash from capital markets.
>
> "There seems to be no appetite for cutting off their capital," Ramsey said. "As long as it's related to growth, they're not going to have any problem selling it."

Musk's vision for Tesla in 2015 was to build a car company capable of producing one million units annually by 2020 (Carson, 2016). However, the vision represented a doubling of his earlier production projections for 2020 and accelerating his previous production goal of 500,000 to 2018 (Rogowsky, 2017). Tesla's production would have to increase at more than 50% per year, based upon 2015 production of roughly 40,000 units, to achieve these numbers (see Table 1). While Tesla fans were excited by Elon's promises to bring scaled production and lower priced offerings, analysts and investors were beginning to become wary of such ambitious forecasts. Most notably, while Tesla was projecting aggressive growth, short-term production was falling short. In 2016, Tesla forecast production numbers of 80,000, but fell short, delivering just over 76,230 (Rogowsky, 2017).

Table 1: Total number of Tesla vehicles delivered. Source: Tesla (n.d.)

2015 Q2	11,532
2015 Q3	11,603
2015 Q4	17,400
2016 Q1	14,820
2016 Q2	14,370
2016 Q3	24,500
2016 Q4	22,200
2017 Q1	25,000
2017 Q2	22,000
2017 Q3	26,150
2017 Q4	29,870
2018 Q1	29,980

4. Reconciling the Model 3 with Production Hell

Elon Musk had unveiled the Model 3 sedan in July 2016, and began taking $1,000 reservations in 2017. The Model 3 was a lower priced sedan with margins that would require a significant ramp up in production in order to be profitable.

High performance electric sedans priced for the affluent was a niche market, but the Model 3 was aimed at the mass market. An affordable electric vehicle, the Nissan Leaf, had been on the market for several years, but held a battery range of only 100 miles, so it was viewed as a second vehicle by many or simply impractical for areas without wide access to charging stations. The Model 3 was Tesla's move into the mainstream with a price starting at $35,000 and a battery range of 220 miles (Golson, 2016). If the price and range was attractive, then mass-market consumers might set aside notions of "range anxiety" and embrace electrified transportation as their main vehicle. Following Tesla's announcement of the Model 3, over 455,000 pre-production reservations were collected (Korosec, 2017). Being the first automaker to market by announcing a mainstream electric vehicle allowed the firm to capture significant earned media coverage, in addition to early revenues. Following several delays, the first Model 3 vehicles were delivered to Tesla employees in August 2017. However, the first deliveries to regular customers didn't begin until December 2017 (Lambert, 2017).

Musk's social media engagement and steady pace of new product announcements, whether for Tesla or any of Musk's other companies, enabled Tesla to largely forgo traditional marketing. In fact, Tesla did not engage any paid media to promote the brand or the products. Meanwhile, Musk promised another model, not yet available for reservation or named, but widely referred to as the Model Y for production in 2019 (Dow, 2018). Furthermore, the firm unveiled the

Tesla Semi and Roadster 2, both to be available in 2020, and currently accepting reservations.

However, recent production and quality issues presented a challenge and vulnerability to the brand. While consumers may be willing to overlook production and quality issues for newer firms and products that seem to deliver the future today, Tesla was beginning to face some very real present day issues.

The attractiveness of a Tesla auto was rooted in design and performance, and to these aspects the firm excelled. However, quality of the product was seriously lagging behind its competitors. While the Tesla Model S enjoyed significant fanfare upon its launch in 2013, with Consumer Reports ranking the car as the highest scoring vehicle they had ever reviewed, the endorsement was subsequently removed when persistent quality issues arose (Rechtin, 2015). Consumers may initially regard a well-designed, high-tech car as synonymous with quality, but the reality is that the build construction and reliability ranks below rival firms. Tesla's 50,000-mile warranty covers many of the issues that arise, but it raises the question of what impacts out-of-pocket repairs will have on the brand when the warranty expires. Quality and reliability issues are persistently plaguing the Model X sport utility vehicle, receiving the distinction of 'least reliable' vehicle for 2017 (Cunningham, 2017). Furthermore, the quality issues facing Tesla are not just limited to 'after the sale' problems, but are the source of considerable headaches that complicate their efforts to scale production. Nine workers, both current and former, noted in November 2017, that, "Quality checks have routinely revealed defects in more than 90 percent of Model S and Model X vehicles inspected after assembly" (Sage, 2017). Additionally, flawed component parts have further hindered production and drain profitability as, "one current Tesla engineer estimated that 40 percent of the parts made or received at its Fremont factory require rework" (Kolodny, 2018). Lean manufacturing specialist Matt Girvan, founder of MAG Consulting, noted:

> Even during what is considered "launch" mode, if a company is selling its cars to customers, it should not be experiencing large amounts of rework. This speaks to an internal quality issue that is on a magnitude that is not normal for most car manufacturers.

As it stood, just 9,766 Model 3 sedans had been assembled by the end of March 2018 (Glon & Bassett, 2018). The first deliveries of the Model 3 began in August 2017, and Tesla projected production numbers of 5,000 units per week by December. However, supply bottlenecks, quality defects, and difficulties in automation held the current pace of production to approximately 800 units per week. Munro & Associates, a firm that disassembles new vehicles for analysis, notes that, "Mechanically, I don't have much good to say," and, "if it would have come out even decent, they'd have mopped the floor with everybody," however the assessment was that the build quality of a Tesla was subpar (Welch, 2018).

5. Market Strategy: The Road Ahead

James left the office to clear his head and develop an objective perspective to guide his plan. Tesla had benefitted from being perceived as a "first mover" and innovator, but James also noted that Tesla had yet to make any money. Silicon Valley startups frequently lost money while the business scaled operations, but a firm that was now in its fifteenth year of operations was hardly a startup. Additionally, James noted that financial markets had seemed to sour on Tesla, and the stock price was down approximately 20% since peaking in the summer of 2017. Furthermore, James sensed that the cash position of Tesla was starting to cause concern. As a result, James realized his plan needed focus and may require some painful tradeoffs.

How important was being first? James kept circling back to this question and while he had studied the descriptive factors that lead to achieving a first mover advantage, he noted that what he really needed was a predictive tool to help him.

6. First-Mover Advantage

In 1988, strategic management researchers, Lieberman and Montgomery, wrote that a first-mover advantage arises from leveraging three sources (Lieberman & Montgomery, 1988):

1. Technological leadership
2. Securing necessary resources
3. Increase switching costs

The leadership in technology delivers an advantage if rivals need to traverse a learning curve before they can offer up their own alternative offering. The time and resources that laggards expend to copy the technology gives the leader time to capture market share and scale to deter rivals.

While technological leadership is rooted in the development of what others lack, securing resources is rooted in exploiting supply chain needs. If certain inputs are limited, then an advantage can be had by securing supply partnerships that make it difficult for competitors to imitate, even if they have the technology to do so.

Lastly, switching costs make it more difficult for consumers to abandon the first mover for a competitor offering. Software that only works with certain hardware increases the switching cost for a consumer that wishes to switch by increasing the total cost.

The first-mover advantage account offered by Lieberman and Montgomery was used to describe how some firms found success, but it didn't account for competitors that quickly entered the market second. If competitors were nimble, then the first-mover advantage might never materialize sufficiently to payback the investment in launching a new product.

In 2005, Suarez and Lanzolla offered up a different approach in an article titled *The Half Truth of the First Mover Advantage* to the first-mover advantage by noting the intersection of market growth and technology evolution held predictive power as to whether a short-term or long-term competitive advantage could be had by entering the market first (see Table 2).

Table 2: The Combined Effect of Market and Technological Change (Adapted from: Suarez & Lanzolla, 2005)

Pace of Technological Change	**Pace of Market Change**	
	Slow	Fast
Slow	Calm Waters	The Market Leads
Fast	The Technology Leads	Rough Waters

This market and technology intersection describes the four options for market and tech evolution, and gives one example of an industry for each of the quadrants, described below.

Calm Waters: A gradual pace of technology change and slow market growth allows little room for the new entrant followers to differentiate. Innovation is frequently not different enough to allow a foothold for the new entrant, the second movers, thus the incumbent has the advantage. First movers have a steady enough position that they can adapt to changes, thereby insulating the firm from competitive threat. Calm waters are the ideal conditions for start-up firms, due to the fact that they ought to be able to scale up production to satisfy demand. For example, "calm waters" is descriptive of 3M's Scotch Tape, the pace of tech change was slow enough that rivals couldn't outmaneuver or find a differentiated niche.

Market Leads, Tech Slow: When the market develops rapidly, firms with significant resources have the advantage to meet blossoming demand. Small firms are apt to lose their early advantage. For example, Singer sewing machines were second to market, but used their manufacturing scale to overwhelm the market first mover.

Tech Leads, Market Slow: Here, nobody is apt to gain a short-term advantage. Firms enter and exit. Wall Street will become skeptical as well, and is likely to pressure the firm to eliminate underperforming projects. Only very well capitalized firms, with robust R&D, should enter this market first, but they must be committed to weathering the storm of lackluster market performance for a long-term durable advantage to payoff. The rapid pace of technology development in digital cameras was offset by slow market growth.

Rough Waters: Very difficult to obtain any advantage, short or long-term in nature. Product obsolescence occurs rapidly and usually new entrants steal the momentum. The personal computing market of the 1980s illustrates the intense competition that resulted from a rapidly growing market and rapid technology evolution.

Tesla held an advantage in their batteries and electronic components, but much of the rest of their vehicles were of inferior build quality (Welch, 2018). While Tesla was first to announce the Model 3, GM beat them to delivering a similar vehicle to the market. GM's Chevrolet Bolt was priced comparably and delivered 10% greater battery range than the Model 3 (Manjoo, 2016). Additionally, a GM auto could be serviced nearly anywhere in the country, while Tesla lacked the market penetration to sell or service many markets. Tesla had no presence in six states, and was very limited in others. For example, Tesla offered just two service centers for the entire state of Florida, and most independent shops couldn't service their vehicles. Additionally, James noted that while media coverage focused on the promises Musk made in announcing products, Tesla was only delivering Model 3's configured to cost as much as $78,000 (Blakewell & Kharif, 2018). Model 3's priced at $35,000 were not currently being built and all mention of this price point was removed from the company web site in July 2018 (Coberly, 2018). When pressed, Tesla had extended the promised production date of the $35,000 sedan to, perhaps, early 2019. However, AutoNation CEO, Mike Jackson, accused Tesla of running a "bait and switch" pricing scheme (Belvedere, 2018). Therefore, James wondered if Tesla would be able to compete directly with such a large competitor as GM, not to mention others that were soon to enter the market.

If James was to offer up a marketing strategy committed to Tesla's current product line, then he would need focus on strengthening the favorable associations of innovation, technology, and design, while anticipating that production and product reliability concerns may remain an ongoing problem, especially since service was so geographically limited for his brand.

Additionally, James was forced to consider a new product rollout. If the product strategy pivoted to the Tesla Semi, then the firm may need to retool their current marketing strategy to meet the needs of the B2B marketplace. The Tesla Semi represented an entirely new market driven by different criteria than the passenger automobile market. Semi-truck fleets were commercial haulers that cared less about the amenities than the economics. While Tesla had not yet identified where the Semi would be manufactured, Musk was promising a savings payback in just two years (Ferris, 2018). The capital necessary to tool up for the Semi and support its launch would strain the firm's resources, but would offer healthy product margins. Additionally, if part of Tesla's mission was to reduce fossil fuel driven vehicles and emissions, then electric trucks offered a path to far greater impact than automobiles. Long haul semi-truck drivers log as many as

125,000 miles per year (FTI, 2015). By contrast, the Federal Highway Administration reports that the average number of miles driven by automobiles was 13,476 miles (Office of Highway Policy Information, 2018).

For James to offer the most compelling marketing strategy, he would need to support his recommendations with evidence. James collected electric vehicles sales data (see Table 3 and Table 4) and overall market figures for the United States automobile market (see Table 5), in addition to semi-trucks (see Table 6).

Table 3: 2017 Total Sales of Electric Vehicles in the US and Worldwide (Adapted from: Loveday, 2018)

2017	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Tesla	1650	2550	6200	1840	3350	4550	3105	3800	8097	2115	3555	9335	50147
GM	2780	2776	3115	3110	3399	3415	3514	3576	4112	4170	4725	5201	43893
BMW	841	830	1556	1226	1612	1874	2004	1729	1861	2062	2821	2792	21208
Toyota*	1366	1362	1618	1819	1908	1619	1645	1820	1899	1626	1834	2420	20936
Ford	1135	1704	2071	1750	2082	1753	1695	1598	1577	1425	1375	1424	19589
Nissan	772	1037	1478	1063	1392	1506	1283	1154	1055	213	175	102	11230
Fiat	752	590	785	541	473	359	395	290	285	310	215	385	5380
Chrysler	12	0	0	335	705	355	125	425	475	875	570	720	44597
Kia	128	213	241	253	214	178	275	482	483	445	420	338	3670
VW	332	293	342	307	381	232	308	317	187	203	289	343	3534
Hyundai	190	175	300	299	295	313	248	251	226	238	158	274	2967
Audi	387	400	414	301	294	324	218	129	85	17	38	270	2877
Mercedes Benz	370	217	174	186	169	168	344	325	262	132	230	300	2877
Volvo	96	83	103	145	146	202	187	330	338	302	318	594	2844
Honda	0	0	0	0	0	0	34	15	52	34	464	1425	2024
Porsche	179	122	1129	187	175	195	160	179	1125	75	43	223	1592
Mitsubishi	0	1	3	2	0	0	0	0	0	0	0	99	105
Monthly Totals	10990	12353	18529	13364	16595	17043	15540	16420	21119	14242	17230	26045	199470
2016 Totals	20330	22156	30858	24888	29840	29536	27975	29040	34141	26369	30905	42755	348793
* Toyota Figures include plug-in hybrid electric models only. Data unavailable for standard Prius model													

Table 4: 2016 Total sales of Electric Vehicles in the US and Worldwide (Adapted from: Cole, 2017)

2016	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Tesla	1120	1820	5850	1595	2800	5845	2704	4685	7550	1425	2000	9725	47119
GM	1202	1433	2221	2497	2340	2390	2754	2379	2352	2454	2575	4290	28887
BMW	395	647	753	1624	1409	1386	2375	2085	1085	1139	1453	1756	16107
Toyota*	10	6	7	4	4	11	4	2	4	0	781	1641	2474
Ford	997	1503	1958	2019	2045	2384	2154	2204	2463	2016	2604	2489	24836
Nissan	755	930	1246	787	979	1096	1063	1066	1316	1412	1457	1899	14006
Fiat	305	210	455	395	425	280	225	360	690	745	590	650	5330
Chrysler	0	0	0	0	0	0	0	0	0	0	0	0	0
Kia	81	60	79	139	120	134	179	153	217	190	179	197	1728
VW	328	198	86	326	269	248	344	454	529	407	305	443	3937
Hyundai	175	200	275	250	235	225	375	235	260	255	285	325	3095
Audi	327	243	332	326	361	353	349	346	312	348	394	589	4280
Mercedes Benz	77	70	78	85	76	90	112	111	118	251	134	379	1581
Volvo	226	176	178	150	110	166	178	176	148	142	161	204	2015
Honda	0	0	0	0	0	0	0	0	0	0	0	0	0
Porsche	173	209	267	262	217	198	169	256	159	176	267	155	2508
Mitsubishi	2	5	1	6	2	4	20	25	17	4	5	3	94
Monthly Totals	6173	7710	13786	10465	11392	14810	13005	14537	17220	10964	13190	24745	157997
2015 Totals	6057	6951	10341	9094	11540	10364	8951	8972	10134	9926	10070	13699	116099
* Toyota Figures include plug-in hybrid electric models only. Data unavailable for standard Prius model													

Table 5: U.S. New Automobile Sales. Source: U.S. Department of Transportation (n.d.)

2017	6,332,925
2016	7,104,593
2015	7,731,429
2014	7,918,601
2013	7,780,710
2012	7,243,654
2011	6,089,403
2010	5,635,432
2009	5,400,890
2008	6,769,107
2007	7,562,334
2006	7,761,592
2005	7,659,983
2004	7,482,555
2003	7,555,551
2002	8,042,255
2001	8,352,000
2000	8,777,723
1999	8,637,708
1998	8,084,989

Table 6: Heavy Duty U.S. Truck Sales (rounded to the nearest 1000). Source: U.S. Dept. of Energy (n.d.)

2001	452,000
2002	402,000
2003	420,000
2004	538,000
2005	664,000
2006	694,000
2007	537,000
2008	432,000
2009	312,000
2010	378,000
2011	500,000
2012	569,000
2013	606,000
2014	671,000
2015	732,000
2016	697,000

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