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MARKETING STRATEGY: AUTONOMOUS CAR INDUSTRY

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AUTONOMOUS CAR

INDUSTRY

by

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ABSTRACT

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As autonomous cars begin their penetration into the consumer market, many consumers are uncertain of their implications for them and their safety. Numerous companies and services such as Tesla, Volvo, Uber, Google, and Apple are finding new ways to market their prototypes to an already established industry. Although sustainability and efficiency are key points to market concerning autonomous technologies, automakers need to strategize how they can better sell their evolving technologies in the established automobile industry. The central focus of this research is to analyze and provide recommendations on how to market autonomous cars to consumers, specifically regarding the safety. Doing so will facilitate with customer acquisition. By strategically analyzing what attributes consumer value, this study will allow marketers to identify their niche of consumers to focus on as their target market, or potentially expand this customer base.

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CHAPTER 1

INTRODUCTION

To better understand the importance of company progress, it is important to understand the methods by which companies capitalize their core competencies through resources and capabilities. The actions of optimizing opportunity while minimizing threats are called strategy. In order for companies to create value for themselves, their consumers, and their stakeholders, they must continuously keep innovating. This innovation is not done without the consideration of competition. Generally speaking, competition and risk drive companies to stay active in their industry in terms of innovation and drive. Without proper understanding of the market the companies are operating in, the company cannot analyze the situation to identify its internal strengths and weaknesses in the external environment. Every company has its own core competencies and strategies. Specific to the auto industry, the 21st century's lean towards technology has caused many companies to adapt their strategies to the global market competition. Many companies are now revolutionizing the industry with the emergence of autonomous, self-driving cars.

Autonomous cars have long been a goal of automakers. The first self-driving car was first invented in 1977 in Japan. This prototype could identify images from the road from two cameras. The prototype did not go very fast, with an approximate speed of 30 mph, but it allowed for the emergence of technological advancement of prototypes that emerged in the next few years (Vanderbilt).

Currently, there are many brands that produce cars with autonomous technology. Tesla, Google, Ford, Volvo, Mercedes-Benz, and BMW are among a few companies that produce these cars. These cars utilize technology of sensors so the car can view 360 degrees of its surroundings to maneuver accordingly. Tesla is unique in that its autonomous technology can be downloaded over-the-air. This means that software from the autonomous car can be downloaded through the car anywhere as long as it has a stable Wi-Fi connection. As autonomous technology continues to mature, consumers are developing their own perceptions about it. The industry is expected to boom in the coming years.

1.1 Objectives

In terms of marketing, this research project will analyze how the self-driving car brands and businesses can better improve their marketing strategy in regards to safety to gain customer acquisition in their developing industry. Different segments of the general environment and secondary research will identify opportunities and threats that will be used in the SWOT Analysis. By obtaining a better understanding of each aspect of the general environment, the opportunities and threats can be exploited or neutralized accordingly to provide recommendations for marketing. By understanding the current aspects of autonomous car industry, better strategy for customer acquisition can be identified. This results in a higher market share with stakeholders, and ultimately more value for consumers and the industry. The recommendations of the project, which are based off of the data collection listed in the methodology, could increase the customer base for brands utilizing autonomous cars. This research will also help current car brands that are looking into manufacturing self-driving cars. This way, with data from car-buyers,

automobile businesses will spend less money in figuring out how to better market their product.

CHAPTER 2

INDUSTRY BACKGROUND

In order to understand the autonomous car industry better, it is important that the general environment is identified. The general environment pertains to this research because it shows what marketers need to consider when marketing this industry to its consumers. Because of product substitutes, companies within this industry *must* maintain a competitive advantage by adapting their safety strategies towards things identified in the general environment. There are numerous substitutes such as public transportation, walking, hybrid cars, and fuel-dependent cars. By analyzing each component of the general environment, companies can adapt their strategy to better market to consumers to create a competitive advantage.

2.1 General Environment

The general environment within the external environment contains six segments: political/legal, economy, global, demographics, sociocultural, technology, and sustainable physical. There are multiple predictions that are made in order for companies to better formulate their strategies and marketing towards maintaining their competitive advantage in relation to their industry. Below, each aspect of the external environment is described to show the available opportunities and threats that may arise in the overall autonomous car industry..

2.1.1 Political/Legal

The FDA and EPA heavily regulate the automobile industry. There are multiple aspects such as seat belts, licensing, liability, vehicle regulation, drinking laws, and speed laws that control the driving behavior on the roads. The automobile industry currently takes into consideration these regulations while producing their vehicles.

On March 31, 2017, Goolsby Leadership Academy had a chance to visit the General Motors plant located in Arlington, Texas. The presenter explained the different types of tasks and systems that General Motors uses on its production line. The tour consisted of a chance to see first-hand the production of their vehicles. The production of vehicles is important as a factor of the political/legal environment, because with the new emergence of autonomous vehicles predicted to take the road, the already established facility used for the production of SUVs might be required to alter its manufacturing systems and overall facility layout to fit into the industry. The cars will then need to conform to the new government regulations that could perhaps increase or decrease the number of workers on the production line, the types of technologies that can be found within the car, the seat belts or new forms of safety, new regulations for evaluating the sensors, etc. As for GM, they have signed the SAVE Act legislation in order to begin their production of autonomous vehicles. The SAVE Act was put into effect to increase regulation regarding safety. Specifically, this Act modifies the regulations on CAV technology, or Connected and Autonomous Vehicle technology. General Motors is currently testing their production of autonomous vehicles at their plant in Michigan (Kelly). Their chairman and CEO, Mary Barra stated: “Revolutionizing transportation for our customers while improving safety on roads is the goal of our autonomous vehicle technology, and today’s announcement gets us

one step closer to making this vision a reality. Our autonomous technology will be reliable and safe, as customers have come to expect from any of our vehicles" (Valdes-Dapenda, CNN Tech). GM's core competency is safety; therefore they are marketing their autonomous vehicles in relation to their focus on safety. If GM chooses to continue expanding their production facilities past Michigan, they must invest their money into retrofitting their production facilities in order to meet the government regulations that will soon be enacted. Considering the size and complexity of each facility, there needs to be a forecasted amount of funds set aside to combat the government's future regulations towards manufacturing and safety laws.

The emergence of adapted government regulations will overall be considered a threat in the external environment. Listed below, these are the current NHTSA (National Highway Transportation and Safety Administration 2013) classifications of automation for vehicles:

Table 2.1: NHTSA Federal Classifications of Automation

Automation Level	Automation Name	Key Features
Level 0	No Automation	Driver in complete control
Level 1	Function – Specific Automation	Brake assist
Level 2	Combined Function Automation	Two or more automated functions
Level 3	Limited Self-Driving Automation	Partial Autonomy
Level 4	Full Self-Driving Automation	No driver necessary at any time

There can be some sort of opportunity with relating the new regulations to company branding. This is what GM has done by highlighting their core competency towards helping their brand image: safety. New government regulations on autonomous car production

could be costly. The funds that will go towards research and development, potentially new or altered facilities, adapted systems of manufacturing, and even new materials will cost the company. This will have an effect on the internal environment of the company such as workers and the time it will take for all these changes. The companies in this industry must also communicate to their consumers the changes, and ensure their customers that the new product will meet standard regulations.

Alongside the threat of costs to adapt to new regulations, there is a question of liability. Having a driverless car puts the majority of liability on the company that produces the vehicle. This is because the error will not be from the driver fault anymore, but instead focused on manufacturers and insurance companies. This altered shift of liability might be a threat to the manufacturers. The companies must be able to provide ways to analyze how insurance companies can better provide for their drivers in the case of a manufacturing error. Also, considering manufacturing, the insurance companies now have to fully understand the car in any type of environment. The car's technology sensors can virtually sense the surroundings of the vehicle, and then will further react to it. The car can sense, but it cannot make decisions like a human can. The risk in improper reactions to the car will have an effect on liability. This affects how an incident will turn out given that the emergence of this product will produce a mixture of non-autonomous and autonomous vehicles on the road.

There is a similar liability issue initially with the airplane industry. Once planes are in the sky, they are on autopilot, so in any situation that might occur, an investigation will need to determine who was at fault. Without a proper system to combat liability conflict, the airline industry solution was to create the metadata black box that can be used in the

case of accident or plane crashes. This black box is a flight recorder that helps in facilitating anything that occurred in a flight in case of further investigation of any incidents for liability purposes. Research and development was able to add this feature to every airplane. This has helped with understanding situations based off given evidence instead of questioning who was at fault. A black box has multiple components. It is important to understand the complexity of each unit that goes into the black box, for instance how it is used, where it is placed on an airplane for optimal use, and how its data is used in case of incidents.

In terms of autonomous car industry and safety, this black box technology could be an opportunity for the autonomous vehicles companies to manufacture a separate market of black box technology or outsource it. Ensuring liability in the external environment to avoid costly lawsuits, better public relations with consumers, and proper safety analytics, companies producing autonomous vehicles need to consider the innovative options that pertain to ensuring liability all while following the shifting government regulations to keep consumers safe on the roads.

2.1.2 Economy

This section will assess the overall economic opportunities or threats for the autonomous car industry. There will be apparent price changes, and an effect on demand, employment, and forecasting of pricing. For prices, the new Intelligent Transport Systems (ITS) will cause an increase in pricing throughout different aspects of production. Facilities and factories will need to be altered in order to sustain production demand of its consumers as well as meet government regulation. There is also the additional cost of researching and developing new or altered components that go into the vehicle such as sensor technology,

safety features, adaptive cruise control, and braking systems. Each of these components has the ability to produce more employment opportunities, which is positive to the economy. There is a negative underlying threat though. The increased automation of companies can decrease the need for certain occupations such as truck drivers in distribution. *The Economist* did a video report on the effect of autonomous trucks on the truck driver occupation. Given that this is a large job sector for an estimated 29 states, replacing the jobs of truck drivers can cause a large increase in unemployment across the United States. The report states that "automation could save the industry $168 billion in wages, productivity, and fuel efficiency" which is all a massive opportunity for increased profits, productivity, and safety since it reported "87%" of truck incidents was human error as of March 2017 (Economist, 2017).

Many companies are growing in the face of automation. For example, UBER is already servicing its customers with automated ride-share programs in some states. UBER is using this opportunity to be more available for its consumers who utilize the ride-share program. UBER has reported that although they state their car is autonomous, there is still a necessity for human intervention. UBER's autonomous car has recently been suspended because of a recent collision in Arizona where the car in cruise control was unable to yield to a turning car. The Volvo XC90 was deemed not responsible, but the fear for customers to engage in using this service will not be beneficial to UBER especially since this service is still being introduced gradually to their business. Among UBER and truck drivers, many sources of transportation are looking to become automated in the near future. There are a multitude of different forecasts that show the effects. The cost analysis table from a research study at the University of Texas at Austin below illustrates the economic effects

for industry-specific effects in different fields that will be affected by the introduction of automation into the economy (Clements, 14-15). These effects will directly impact the numerous industries listed below in Table 2.2 as a threat. For some, like freight transportation and the automotive industry, this is a positive opportunity. Meanwhile, for the traffic police and for insurance companies, they will take a direct impact and should find ways to strategize this emergent product. Also, industries such as freight will increase significantly. This is largely due to the use of substitutes.

Table 2.2: Industry Specific Effects of Car Automation

INDUSTRY-SPECIFIC EFFECTS				
Industry	Size of Industry (billions)	Dollar Change in Industry (billions)	Percent Change in Industry	$/Capita
Insurance	$180	-$108	-60%	$339
Freight	$604	+$100	+17%	$313
Land Development	$931	+$45	+5%	$142
Automotive	$570	+$42	+7%	$132
Personal Transportation	$86	-$27	-31%	$83
Electronics	$203	+$26	+13%	$83
Auto Repair	$58	-$15	-26%	$47
Digital Media	$42	+$14	+5%	$44
Oil and Gas	$284	+$14	+5%	$44
Medical	$1,067	-$12	-1%	$36
Infrastructure	$169	-$8	-4%	$24
Traffic Police	$10	-$5	-50%	$16
Legal Profession	$277	-$3	-1%	$10
Total	$4,480	$418	9%	$1,312

+ = Industry Gain - = Industry Loss,
$/per capita and Total: All values added due net economic/consumer benefit

2.1.3 Global

For this segment, the autonomous car seeks to emerge into a global market. There is an opportunity here because many countries manufacture their own vehicles while others outsource. During June 2016, I had a chance to visit the Hyundai Factory in Beijing, China. They were not producing autonomous vehicles at that point, but I was able to see the impact of manufacturing in a foreign country. Already in Beijing and Shanghai, there is saturation of the population. To combat this population increase, China has a lottery for license plates for what days people can drive their cars on the roads. The emergence of autonomous cars would be a major opportunity for populations like India or China. The setback will be the reachability of some automation. Truck drivers for distribution, for example, will not be able to reach certain areas because of infrastructure limitations of highways or roads in general. The decrease in accidents can also help with keeping the flow of traffic to reduce the current high-density issues abroad. There is also an opportunity with the external environment, since the overall Global Market of autonomous car growth is forecasted to grow to $77 Billion dollars by 2025 (Green, 2015). China and the United States will initially dominate the market as the product emerges. This might be because of technological advances or manufacturing capabilities within these two locations. After some time, China is then estimated to take over the market share for autonomous cars. This makes sense given that their benefit will be greatest from their economic standpoint.

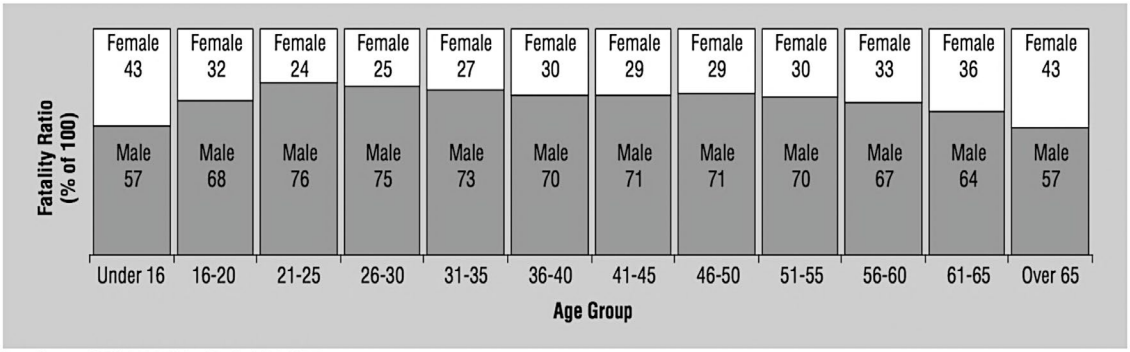
The increase in a global footprint for this industry has implications towards marketing safety. There must be consistency in the safety. This needs to be considered based on the infrastructure of the geographical locations the business will be in. Manufacturers must understand how to alter their vehicle to pertain to the lack of

infrastructure worldwide. If the vehicle is introduced to a global market that does not have an infrastructure prepared to handle this technology, it will cause negative perceptions towards the industry, therefore losing a possible niche of consumers.

2.1.4 Demographics

Demographics tie into who is willing and able to buy the autonomous vehicles. As of now, it seems many companies are adopting this technology such as UBER and potentially the trucking industry. The brands that do produce autonomous cars so far are Tesla, Google, Ford, Volvo, Mercedes-Benz, and BMW, as well as a few others who are in the race to automation. The pricing is the issue here. Because of low production, the price is naturally higher. This limits the availability for a larger demographic. Tesla alone has a customer demographic of individuals approximately 77.3% of which have an income above $100,000. Their customer base is middle-aged, wealthy men. Understanding the demographic of the customers who shop in the electrical car industry will help to identify the demographic of the target market. Since there will be a low supply and an estimated high demand of product, we can assume the autonomous cars will go into the market at a fairly high price. They will be positioned as a luxury good instead of a standard automobile. Understanding the target market demographic helps with assessing how to market the product. In this case it would be more appropriate to market to a demographic that can afford the product's value.

The demographics relate to safety because different age demographics and genders value safety differently. Below, Figure 2.1 illustrates the percentage of accidents based on age and gender for conventional gasoline-run cars.



Data Source: FARS 1996-2005 (Final), 2006 (ARF)

Figure 2.1: Distribution of Total Crash Fatalities by Gender and Age Group

This figure is important since it is clear that different demographics display different driving behaviors generally. Marketing the safety value based on demographic would be based off the attributes the target demographic will benefit from.

2.1.5 Sociocultural

A big threat in the autonomous car industry is the sociocultural factor. Many individuals are skeptical about the necessity of autonomous cars because of safety. Their major setback is the ability to ensure consumers about the reliability of the cars. Based on the mileage logged on self-driving automobiles versus conventional cars, a research study at the University of Michigan's Transportation Research Institute found that autonomous cars had an accident rate that was "still twice as high" in comparison to conventional cars (Woodyard, 2015). The product is still newly penetrating the market and therefore has not established a solid form of consumer loyalty or customer base. There are different reports on the amount of fatalities per road as well listed in Figure 2.1. The research that follows these accidents fails to acknowledge factors such as emotional psychographics, the situation, and whose fault it was. There are numerous subjective factors that tamper with the ability for autonomous car companies to market with safety assurance. For example,

Toyota markets heavily through their 5-Star Safety assurance to their customers. Can they continue to guarantee their consumers that promise if they adopt autonomous cars? How will they produce their sensors? Who is liable? These are questions that companies must consider from their external environment in order to maintain customer loyalty and brand image through the revolutionizing transition. Also companies that have not already adapted to this change must consider how they will adapt their company to it. Proper innovation in relation to the external environment is key to business growth.

This relates to marketing since sociocultural values need to be fully understood. The value and attributes should be marketed to ensure consumers would be safe when owning an autonomous vehicle. The sociocultural section of the general environment is a major concern now with consumers who fail to trust the technology.

2.1.6 Technology

Technology is probably one of the biggest factors of external competitive advantage when assessing the general environment. As an example, take a look back at Radio Shack, which did not follow along the technological advancement with the introduction and dependency on the Internet and new smart phone capabilities. Radio Shack did not properly account for technology when assessing their strategic competitiveness in their market. Some examples of this that led to their demise was not following along with e-commerce for sales of their products. They also were not maximizing their market capabilities to sustain the computer revolution the market underwent during their time in business. These are all key opportunities that could have attributed to Radio Shack's success, but instead ended in their demise (Picchi, 2017).

In terms of autonomous cars, there are multiple pieces of technology that go into the vehicles. Each company will need to be able to differentiate their emergence into this industry. Bruce Henderson states in *The Origin of Strategy*, "Natural competition is evolutionary. Strategic competition is revolutionary" (Henderson 1). Henderson implies that no two of the same companies can co-exist in the same market because of the limitation of resources. There *must* be an expansion and differentiation within one's own market to create the strategic competition he mentions. This relates to technology because many companies might easily copy the technology of autonomy, but what will make them stand out? For example, phones all have the same basic functions of communicating through voice. Companies like Apple and Samsung have revolutionized their marketing and product by differentiating their phones and products. Autonomous cars must differentiate their technology while conforming to the government regulations concerning the autonomous car. This is an opportunity for the industry since it will foster new ways for continued innovation. It can also be considered a threat for companies that will choose to easily rely on the other companies in the industry for technological advancement. They must differentiate by assessing how to position the products on the market based on the technology for pricing. What will make the autonomous car stand out: its design, its lack of repair, its safety ratings, or its technology inside? All these things must be considered about outside competitors in order to understand how to formulate the technology within the company's autonomous vehicle design.

2.1.7 Sustainable Physical

The sustainable physical section of the external environment seeks to understand the macro view of sustainability. Cars right now that are Level 0 produce a multitude of

fuel emissions ranging from Carbon Dioxide and Carbon Monoxide to Hydrocarbons. These emissions gradually have an effect on the air quality and ozone layer, especially in densely populated urban regions such as New York City. There is a great opportunity for the autonomous car industry to be marketed as sustainable. This is an underlying benefit of the product. The cars will be driving their own navigated routes, which will potentially reduce the times it takes to go to certain locations. Also, with fewer collisions on the road, the cars will potentially be spending less time sitting in traffic or other time-consuming things that cause vehicle emissions. Ride-share programs and public transportation automation also allow for efficiency in transporting a multitude of people at an optimum route with less fuel. All these factors add up, especially with the globalization of this industry to parts of the world with high density such as China.

By providing a more efficient way to travel, autonomous cars can increase safety by keeping the flow of traffic and minimizing travel-times. Less time on the roads corresponds to less risk of getting into accidents from fatigue, more exposure to the road, and exposure to other drivers. Less harmful emissions in the air also attributes to a safety measure for by-standards in the area. This affects air quality, and specifically people with breathing conditions, such as asthma.

CHAPTER 3

KEY FINDINGS

Now that aspects of the external environment have been identified, the key findings are based off a SWOT Analysis. Below, Table 3.1 displays the key findings of the SWOT Analysis on the autonomous car industry. This SWOT Analysis will facilitate the possible strategic alternatives marketers need to consider from Chapter 2. Along with a SWOT Analysis, secondary data from an MIT research lab illustrates the attributes consumers would like to see in their vehicles. This study includes the different levels of autonomy and the perceptions about them.

3.1 SWOT Analysis

This SWOT Analysis identifies some notable strengths are the safety measures the autonomous cars can provide. From this SWOT Analysis, it is evident that safety is a key component of the autonomous car industry. Table 3.1 mentions the weakness of ethical decision-making, a major concern for safety. The ethical decision-making is a weakness for numerous companies within this industry. For instance, in the case of a sudden change on the road, many are concerned how the technology will perform its learned behaviors to decide its next course of action. Will the car hit a nearby pedestrian, a nearby car, or a nearby building if put in that situation? The ethical-decision of the cars is a major factory of safety, not only for the driver, but potentially any nearby pedestrians as well. Also, there is a threat of injury from design error. This causes a major safety concern for consumers

who understand that this is a relatively new, reforming industry. Therefore, problems do occur with the manufacturing and software of the autonomous vehicles every now and then.

Table 3.1: Autonomous Car Industry SWOT Analysis

STRENGTHS: • Safer Transportation • Convenience and Luxury • Transport for impaired • Less Stressful Driving • Time	WEAKNESSES: • Reliance on Technology • Lack of required data • Requires Infrastructure • Testing • Legal Implications • Ethical Decision-Making
OPPORTUNITIES: • Business and Manufacturing • City Growth • Emission Control	THREATS: • Injury from Design Error • Eliminates Existing Jobs • Public Transportation • Privacy • Misuse of Technology

When problems do occur, the media usually inform consumers, which create a negative perception of the companies who sell this technology. It deters consumers because consumers are more swayed by any unfortunate risk instead of the benefits that can come with increased autonomous vehicles.

3.2 Sociocultural Study on Safety

In terms of trust, the attitudes of the general public remain uncertain. In a research survey run by MIT, the researcher analyzed the factors of sociocultural attitudes towards the new product of autonomy (Abraham et al., 2016). Their research demographic of trust and preference consisted of individuals from ages 16 – 75+. They answered survey questions based on their preference. Below are the results of two types of in the study.

Table 3.2: Age Differences in Willingness to Use Automation in Vehicles

	Age						
Level of automation	16-24	25-34	35-44	45-54	55-64	65-74	75+
No automation*	12.4%	8.0%	9.7%	6.1%	5.0%	3.8%	3.1%
Emergency Only	18.3%	11.3%	15.7%	16.0%	14.7%	12.2%	16.7%
Help Driver*	26.7%	25.4%	21.1%	41.2%	44.4%	56.0%	52.2%
Partial Autonomy	16.3%	15.3%	19.0%	13.2%	17.0%	13.9%	15.4%
Full Autonomy*	26.2%	40.0%	34.4%	23.4%	18.9%	14.2%	12.7%

*: Age differences significant at α=0.05

Table 3.2 shows a stronger preference towards drivers' assist, or Level 1 Automation based on NHTSA (Abraham et al., 2016). The demographic that preferred the Level 1 were typically drivers over the age of 45. Also, drivers who preferred Full Autonomy, Level 4, were typically between the ages of 25 through 44. This directly relates to the sociocultural standpoint of society since there is a direct correlation between age and preference to the cars. There seems to be less of a willingness to want full driver dependency, Level 0. This signals that consumers are starting to accept the idea of Intelligent Transport Systems. The next data set illustrates the types of features consumers in the study hoped to achieve through the automation. In the next graph, for example, shows what features they prefer they to get out of automation. The results are clearly pointed towards decrease in collision all throughout the age demographics (Abraham et al., 2016).

Table 3.3: Key Automation Features

	Age						
Automation features that…	16-24	25-34	35-44	45-54	55-64	65-74	75+
… reduce potential/severity of collision*	72.8%	78.9%	79.5%	82.4%	85.4%	90.3%	89.0%
… help with speed control*	56.4%	69.2%	66.5%	60.1%	64.8%	62.8%	61.8%
… help with steering*	48.0%	58.3%	56.8%	57.0%	61.0%	62.9%	60.1%
… periodically take control of driving*	55.0%	61.0%	55.9%	44.8%	47.3%	38.1%	38.6%

*: Age differences significant at α=0.05

As seen in Table 3.3, factors such as the willingness to drive an autonomous car, the trust in the new product, the reason they are purchasing the car, and their level of current satisfaction in their current use of transportation, whether Level 0 form or other public forms of transportation, all contribute to the stigma that surrounds the autonomous car industry. Consumers have communicated the attributes they prefer, with most leaning towards the reduction of collision, as well as speed control. Marketing must understand their target market by understanding these aspects to get a better picture of the niche consumers they aim to target, and how to target them. Since most people surveyed noted they wanted the car for collision safety, markets should strategize their advertising and distribution of information towards ensuring this specific value.

3.3 Summary of Key Findings

The SWOT Analysis and the MIT research study both show the need to satisfy consumer preference towards safety. The key findings both make it clear that the attributes consumers look for directly relate to safety and their well-being while operating the vehicle. Therefore, three viable strategy options are considered in order to better cater to consumer values and attributes of this industry as a whole. Chapter Four will provide three viable options to consider based on the key findings in the SWOT Analysis and MIT research study.

CHAPTER 4

CONCLUSION AND RECOMMENDATIONS

Below are three possible recommendations for companies in the autonomous car industry to consider. These three alternatives all pertain to the safety and marketing of the vehicles. By providing more focus on the attribute of safety, marketers will be able to build more trust in consumers about their product. The three viable options are: manufacturing autonomous cars with Black Box technology, marketing to consumers about the safety value, and increasing company differentiation.

4.1 Option One

The first option is to produce autonomous automobiles with Black Box technology. This technology is used in the aerospace industry. Black Box technology helps in case of a situation to airplanes and liability. Black Box, or known as Flight Data Recorders, are recording devices put inside planes to assist the National Transportation Safety Board in times of investigation from incidents. It is estimated that each recorder is $10,000 to $15,000; therefore, it would be more beneficial to possibly engineer a new prototype of recorders specific for autonomous cars to be more cost-effective. These Black Box recorders have dated back to World War II, but are now used to identify the problems that arise in an aircraft incident.

Each Black Box comes with numerous sensors and recorders that assess approximately 88 parameters, including vertical acceleration, pressure altitude, time, airspeed, and numerous other parameters that airplanes would be exposed to while in a

flight. The future of Black Boxes includes possible video recordings to gather more information in assessing incidents. The autonomous car industry should look into the application of a similar metadata Black Box technology to assure information in a liability issue and to provide more safety options for consumers. By doing so would help marketers assure safety in case of an incident and for manufacturers to correct the issue in their production. To be more cost-effective, car companies should adapt this technology to fit the metrics and parameters of the car. They should consider outsourcing research and development to a third-party company to assure quality and conformity between different industries. The Black Box technology would be a way for manufacturers to assess what occurred during incidents. They can use that data in order to correct problems that might have been from manufacturing or software errors. In the long run, there are positive benefits with the potential of Black Box recording devises in autonomous cars that could reduce manufacturing error, liability concerns, and adapting technology towards more ethical-decision making.

4.2 Option Two

Also, marketing the overall safety value would resonate better with consumers. Right now, people are relying on the media's depiction of few, numbered cases. The autonomous car industry should be marketed by informing the public of all the technologies that go into them to ensure safety. Tesla currently uses a push marketing strategy by directly marketing to their consumers at their showrooms. This is important to consider for the industry since it allows for more control of the information that is put out to the public. If more and more consumers are able to communicate and ask questions about the types of technology and the safety implications it has on them, they will feel more comfortable with

the idea of potentially owning the car.

In regards to Chapter Two, the external environment has a lot to do with consumer perception. For instance, the current economic times have a direct effect on consumer behavior. Therefore, if autonomous cars were sold to a premium niche of consumers, it would be difficult to market to them without a desire to buy. By considering the external environment when marketing safety, marketers should really exploit their opportunities of long-term safety to its consumers. This long-term implication and control of information is based off how much consumers value their safety. Based off the key findings in Chapter Three, it is evident that consumers see automation specifically for its safety benefits and attributes, therefore providing them that reassurance will resonate more with them. This industry is still maturing, therefore data will always need to be collected and adapted to facilitate marketing of information about autonomous technology.

4.3 Option Three

For option three, there should be company differentiation for each car. This differentiation is determined by the core competencies of each company. This way, increased differentiation will produce competition. Competition within the industry will encourage innovation and accuracy with production of their product. Especially in an industry that is still maturing, competition will facilitate fast growth of this technology. If all companies within this industry advertised their product as safe, there would not be much of a consumer response. Instead, by increasing differentiation, advertising the data, and adapting the key features that ensure safety that are specific to that product will help facilitate the competitive advantage of the companies. There will be competition not only within the companies in this industry, but also with the external environment, since these

autonomous cars are competing with an already established transportation market with numerous substitutes.

4.4 Conclusion

There are numerous opportunities for marketing in the industry. First, the strength of technology is a major opportunity for the entire industry. By optimizing the innovative side of the industry towards revolutionizing technology globally, there lies a huge opportunity and shift of driverless cars that will inevitably reach consumers. A strategic alternative to counteracting the injury from faulty design would be to capitalize on the strength of safer technology. Now, in terms of marketing, the different external aspects have been assessed through this report to showcase any opportunities and threats that may arise when marketing to potential consumers. The external environment identified numerous factors that contribute to the SWOT Analysis located in the key findings. The SWOT Analysis was a way to determine key strengths and weaknesses marketers should consider while also keeping into mind the external factors that have an effect on consumers. The study at MIT determined that there is a high interest in automation specifically for its attributes of safety. This, combined with a SWOT Analysis, shows that safety is a strength that the autonomous car industry can provide. Overall, the three viable options are ways that can facilitate consumer understanding of how they can benefit from the safety features of the technology. Manufacturing or outsourcing the production of Black Box technology neutralizes the threat of liability and the loss of money for insurance companies, both of which were identified in the external environment. Also, marketing the attributes of safety to consumers instead of merely the technology can attract consumers to see the product for what it is instead of the speculations that media is portraying about the product. Lastly, to

grow this industry and potentially have more companies involved, there must be differentiation. Differentiation will be more of a competitive drive for the companies to offer the best features they can. Since safety is a major component of these features, companies will most likely adapt their safety first to ensure more accuracy in manufacturing their products, and overall the ability for them to market their competitive safety features to their consumers to create more of a desire. These three potential options will facilitate the growing move towards providing consumers the safety, accuracy, and desirable product in a maturing industry.

REFERENCES

Abraham, Hillary, Chaiwoo Lee, Samantha Brady, Craig Fitzgerald, Bruce Mehler, Bryan Reimer, and Joseph Coughlin. "Autonomous Vehicles, Trust, and Driving Alternatives: A Survey of Consumer Preferences." *Agelab Life Tomorrow* (2016): n. page. Web. 2017.

Andrew Keen (2013), "The Future of Travel: How Driverless Cars Could Change Everything," CNN Business Traveler, 15 May.

Black Box Graphic. Digital image. *ABC*. ABC, n.d. Web.

Chaika, Daniil. "Tesla Motor's Strategic Analysis." (n.d.): 1-25. *Academia.edu*. Web. 10 Mar. 2017.

Colonna, Kyle. "Autonomous Cars and Tort Liability." *SSRN Electronic Journal* (n.d.): n. pag. 1 May 2007. Web. 4 Mar. 2017.

CNBC. "Uber Suspends Self-driving Car Program after Arizona Crash." *CNBC*. CNBC, 26 Mar. 2017. Web. 2 Apr. 2017.

Clements, s M., and Kara M. Kockleman. "Economic Effects of Automated Vehicles." (n.d.): n. pag. *Department of Civil, Architectural, and Environmental Engineering*. University of Texas at Austin, Jan. 2017. Web. 18 Mar. 2017

Economist. YouTube. YouTube, 19 Jan. 2017. Web. 9 Mar. 2017. <https://www.youtube.com/watch?v=DClcrd-2T7g>.

Feeney, Matthew. *Is Ridesharing Safe?* 767th ed. Washington, D.C.: Cato Institute, 2015.*Policy Analysis*. CATO Institute, 27 Jan. 2015. Web. 4 Feb. 2017.

Green, Jeff. "Driverless-Car Global Market Seen Reaching $42 Billion by 2025." Bloomberg.com. Bloomberg, 08 Jan. 2015. Web. 2 April 2017.

Henderson, Bruce D. "The Origin of Strategy." *Harvard Business Review*. N.p., 01 Aug. 2014. Web. 4 Apr. 2017.

Hitt, Michael A., R. Duane Ireland, and Robert E. Hoskisson. *Strategic Management: Competitiveness & Globalization: Concepts*. Boston, MA: Cengage Learning, 2017. Print.

Kelly, Kevin. "Extrapolations: transportation." *Kk lifestream*. N.p., n.d. Web. 14 Feb. 2017.

Kelly, Kevin. "GM to Start Autonomous Vehicle Manufacturing and Testing in Michigan."*Media.gm.com*. General Motors Corporate Newsroom, 15 Dec. 2016. Web. 3 Feb. 2017.

Litman, Todd. "Autonomous Vehicle Implementation Predictions Implications for Transport Planning." (n.d.): n. pag. *Victoria Transport Policy Institute*. 27 Feb. 2017. Web. 4 Mar. 2017.

NHTSA (2013), Preliminary Statement of Policy Concerning Automated Vehicles, National Highway Traffic Safety Administration.

Picchi, Aimee. "5 Mistakes That Doomed RadioShack." *CBS News*. CBS Interactive, 03 Feb. 2015. Web. 4 Apr. 2017.

Porter, Michael E. *Harvard Business Review*. Boston, MA: Harvard Business School Pub., 2009. *Harvard Business Review*. 2009. Web. 10 Mar. 2017.

Tao Jiang, Srdjan Petrovic, Uma Ayyer, Anand Tolani, and Sajid Husain. "Self-Driving Cars: Disruptive or Incremental?" *Berkeley University*. N.p., June 2015. Web. 4 Feb. 2017.

Tesla, Inc. "Tesla - Annual Report." *Tesla - Annual Report*. N.p., 2017. Web. 10 Mar. 2017.

Tesla, Inc. "Autopilot." Tesla, Inc. N.p., n.d. Web. 10 Mar. 2017. <https://www.tesla.com/autopilot>.

Valdes-Dapenda, Peter. "GM to build self-driving cars in Detroit." CNN Tech (n.d.): n. pag. Web.

Vanderbilt, Tom. "Autonomous Cars Through the Ages." *Wired*. Conde Nast, 06 Feb. 2012. Web. 14 Mar. 2017.

Waymo. "Journey – Waymo." Waymo. N.p., n.d. Web. 10 Mar. 2017. <https://waymo.com/journey/>.

Weiner, Irene. *Value Chain*. Digital image. *Baker University*. The Ultimate Resource, 2002. Web. 10 Mar. 2017.

Woodyard, Chris. "Study: Self-driving cars have higher accident rate." *USA Today*. Gannett Satellite Information Network, 31 Oct. 2015. Web. 14 Feb. 2017.

BIOGRAPHICAL INFORMATION

Ryma Mahouch was born in Algiers, Algeria in 1995. She moved to the United States in her early childhood residing in New York City in her early childhood. Ryma has had a chance to study her Undergraduate degree in Marketing at the University of Texas at Arlington (UTA). While at UTA, Ryma took part in many leadership opportunities. She was the Co-chair in FLOC and the Program Coordinator for the UTA-HOSTS! Peer Mentoring Program. She also held the position of Recruitment Chair for The Big Event for two years, attended an Alternative Break volunteer trip, and was elected as a UTA Ambassador for three semesters. Ryma has attended numerous leadership development opportunities as well, such as the Leadership Retreat, the Big Event Conference, and Expressions in Leadership. Academically, Ryma joined the Honors College during her junior year. She was a member of the Goolsby Leadership Academy Cohort 2012. As part of the program, she had the opportunity to study abroad in Beijing and Shanghai, China in June 2016.

Alongside campus involvement, Ryma completed an internship with ALDI as a District Manager intern. There, she was able to apply the business concepts she learned to the grocery store business. She looks forward to beginning her career with ALDI as a District Manager starting June 2017.

Ryma enjoys traveling in her free time with family and friends. She loves the small things in life and prides herself in being a Maverick, Class of 2017.