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Awareness of global warming and car purchasing behavior in Singapore

Chika Nakayama

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AWARENESS OF GLOBAL WARMING AND CAR PURCHASING BEHAVIOR IN SINGAPORE

A Project
Presented to the
Faculty of
California State University,
San Bernardino

In Partial Fulfillment
of the Requirements for the Degree
Master of Business Administration

by
Chika Nakayama
June 2008
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Date 5/22/08
ABSTRACT

It is predicted that car ownership in the world will increase by 130 million units by 2015. As car ownership grows globally, one of the biggest challenges facing society is global warming due to increases in greenhouse gas emissions. Expanding hybrid car sales in emerging markets is one of the solutions to combat global warming, while providing consumers with economic benefits.

Hybrid cars have been well received in developed countries as consumers appreciate both economical and environmental benefits. On the other hand, hybrid cars sales in emerging markets have been slow. Therefore, introducing environmentally friendly hybrid cars to new emerging markets requires a sound understanding of consumers and their environment. Hence, the purpose of this study was to determine consumers' attitudes toward and perceptions of global warming and hybrid cars and examine the car purchasing behavior in Asia.

Findings from a survey of 216 Singaporean respondents showed great demand for cars, especially among young people. Meanwhile, the findings suggested that consumers have a low awareness level of hybrid cars and corporate social responsibility (CSR). Over half had little knowledge regarding hybrids and their role in
reducing global warming. Consequently, a majority of respondents do not want to purchase hybrid cars. Hence, marketers need to raise awareness of hybrid cars, as well as stress the importance of the auto manufacturers' role as a socially responsible corporation in protecting the environment. This could differentiate the brand and allow it to gain a competitive advantage in the marketplace.
ACKNOWLEDGMENTS

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CHAPTER ONE
BACKGROUND

Introduction
In developed countries passenger cars are an important part of everyday lives. In economically developing Asian countries, there are emerging markets that the automotive industry can capitalize upon in the future. It is predicted that car ownership in the world will increase by 130 million units by 2015 (Sato, 2007). Most of the new car ownership will be in these emerging markets such as China and India with growth in low-price passenger vehicles (less than $10,000 USD) (Sato, 2007). As car ownership grows globally, one of the biggest challenges facing society is global warming due to increases in greenhouse gas emissions.

However, another industry trend is improving oil efficiency and developing environmentally friendly vehicles against the background of increasing oil prices. Expanding hybrid car sales in these emerging markets is one of the solutions to combat global warming while providing consumers with economic benefits (Sato, 2007).

Thus, understanding consumers’ perceptions of global warming and recent environmentally friendly technologies,
such as hybrid cars, is critical for marketers to develop strategies to encourage adoption. Hence, the purpose of this study was to measure the awareness of global warming and attitudes towards hybrid cars in Asia.

Along with the growing awareness of global warming, higher oil prices have had a significant impact on demand for fuel-efficient cars, especially hybrids in the US (Vlasic, 2008). In the last decade, the price of gas has doubled from below $1.5 a gallon to over $3 a gallon and Internet searches for both new and used hybrid cars are escalating (Hybrid car organization, 2005). At the beginning of 2008, the price of crude oil hit $100 per barrel (Gross, 2008) and the uncertainty of future oil prices has encouraged consumers to purchase fuel-efficient cars. Further, automotive manufacturers have been making large investments in research and development regarding hybrid engines and other alternative engine systems (Vlasic, 2008).

Hybrid vehicles have been a new market entry since Honda and Toyota introduced them in the late 1990s (Hybrid car organization, 2005). The sale of hybrid cars has been increasing because of greater fuel economy and lower emissions than traditional fuel cars. According to recent research by Bradley (2007), global hybrid registrations in
2007 were 414,396 units. Top hybrid producer Toyota Motor Corporation has predicted that global annual sales of hybrid cars could reach 1 million in 2010 (Stablum, 2007). In 2007, the top 5 global hybrid markets were USA (70%), Japan (14%), UK (3.4%), Canada (2.9%) and Germany (1.5%) (Bradley, 2007). In USA, the sale of Prius, the best selling hybrid car, reached 110,565 units through July 2007, nearly double from 59,270 units during the same period of 2006. (Madden 2007) Hybrid cars have been well received in Japan and other developed countries in Europe and North America.

However, emerging markets, such as India, South America, and China are those that need clean, environmentally friendly technology. In such emerging markets, the number of passenger cars on the road has dramatically increased. For example in China, the number of privately-owned cars was close to 22 million at the end of 2006 compared to 3.5 million in 2001 according to the National Bureau of Statistics of China (People’s Daily Online, Feb 28th 2007). China has already become the second largest automotive market behind USA. Needless to say, the rapid increase in the number of cars on the road has caused serious pollution. According to the World Bank, 16 of the world’s 20 most polluted cities are in China
(The Epoch Times, 2006). Most of the other polluted cities are in emerging markets such as Russia and India.

However, sales of hybrid cars in emerging markets are slow. Toyota, the first foreign automaker to assemble a hybrid in China, expected to sell 3,000 Prius in China in 2006, but sales barely reached half of the expectation (Madden, 2007). According to CSM Worldwide just 10,000 units of hybrid cars will be sold by 2012 in China (Webb, 2006).

One of the reasons why hybrid cars sales are slow is the gap between annual income and car prices. According to Marubeni (2005), the median transaction price of cars is 32% of average gross annual household income in the US, yet 134% in China and 123% in India. This means that cars are still expensive in these countries since the average price exceeds most consumers' annual household incomes. Therefore, although consumers may want to, most are unlikely to pay the premium price for an environmentally friendly car. Another reason might be less environmental awareness among consumers in these emerging markets. Environmental benefits that made hybrid cars popular in the US might not appeal to consumers in emerging markets because of a lack of environmental awareness.
Also, insufficient governmental incentives might be another issue as to why hybrids are not popular in these countries (Tadachi, 2008). Governmental incentives, such as tax savings, are essential to encourage adoption of hybrid cars. Such incentives would cover the extra cost of owning hybrid technology and provide greater benefits than owning traditional fuel cars. However governmental incentives for hybrid cars in emerging markets are not sufficient to encourage consumer adoption of hybrid cars (Tadachi, 2008).

Another trend in the automotive industry is the production of small, inexpensive cars in emerging markets. According to Kamdar (2008), Tata motors introduced a $2,500 car at the New Delhi Auto Expo January 2008 so that more people could purchase a car. India is predicted to become the world’s second largest auto market in the next few decades, reaching as many as 600 million units by 2050, which is more than twice as many cars currently registered in the US (Kamdar, 2008).

The introduction of a small, inexpensive car would accelerate widespread use of it as a primary mode of transportation. Further, price-sensitive Asian consumers would be willing to purchase them. What would be the consequence? If millions of Indians and Chinese people
start owning cars, the earth may no longer be sustainable (Kamdar, 2008). How can we avoid the global disaster? First, automakers have to continue developing environmentally friendly cars to reduce the polluting emissions and to improve their fuel efficiency. Second, governments have to encourage consumers to purchase environmentally friendly cars through tax savings and other incentives. Third, both governments and automakers should educate people about and encourage adoption of environmentally friendly cars (Tadachi, 2008).

Singapore Market

The Singapore GDP per person is the highest in Asia followed by Japan, which means more and more consumers have purchasing power for cars. Singapore is located at the southern tip of Malay Peninsula, with a population of 4,680,600 as 2007 estimate (Singapore Department of Statistics, 2007). Despite their high GDP per person, car ownership is relatively low (approximately 10%) compared to countries with similar GDP levels because of the high cost of car ownership in the country (The Economist Intelligence Unit Limited, 2005). Since Singapore is a small nation and densely populated, the government controls the number of cars registered every year. Car
owners pay an additional registration fee (ARF) as well as paying for a Certificate of Entitlement (COE) and excise duties. According to The Economist Intelligence Unit (2005), "In November 2005 COE permits cost about S$14,700 (about US$8,855) for cars with engines smaller than 1.6 liters and $14,751 for cars with engines larger than 1.6 liters" (2005, p. 83).

Moreover, the electronic road-pricing network (ERP) that is placed at busy traffic areas, charges drivers when they enter these busy areas. Therefore, the cost of car ownership is heavily influenced by governmental levy (The Economist Intelligence Unit Limited, 2005).

Problem Statement

The purpose of this study was to determine consumers' attitudes toward and perceptions of global warming and hybrid cars and examine the car purchasing behavior in Singapore.

The benefits of the study will provide marketers with insight of consumers' demand for cars in Singapore. Findings will help automakers develop more effective, consumer-oriented advertising plans for cars in Asia as Singapore consists of diverse Asian ethnic backgrounds, Chinese, Indian, and Malaysian.
Limitations of the Study

This study was limited to a random sample of Singaporean residents. Further, due to time and financial constraints the study was limited to a sample drawn in the city of Singapore during the latter part of 2007.

Organization of the Study

This project is divided into five chapters. Chapter One provides an introduction to the context of the problem, purpose, benefits of the study, as well as its limitations. Chapter Two is a review of relevant literature. Chapter Three shows the method used in collecting the data and explains the instrument. Chapter Four presents the findings of the study and finally chapter Five discusses conclusions and implications drawn from the study’s findings followed by the Appendix.
CHAPTER TWO

REVIEW OF LITERATURE

The Diffusion Process

Innovations do not spread all at once and hybrid cars are no exception. In 1997, when Prius was introduced by Toyota in Japan, sales were just 18,000 units for the first year. Domestic sales of Prius gradually increased reaching 43,700 units in 2005. Toyota started selling Prius in overseas markets including the US and Europe in 2000. In May 2007, cumulative sales of Prius reached over 1,000,000 worldwide (Brown, 2007). Moreover, GM and Ford also started producing hybrid cars or ethanol vehicles recently (Vlasic, 2008). To understand how new technologies are diffused in society, an understanding of diffusion theory is essential.

Diffusion theory was developed by Rogers in his book "Diffusion of Innovations" in 1962. Diffusion theory refers to the spread of a new idea from its source of invention or creation to its ultimate user or adopters (Rogers, 2003). Rogers distinguishes diffusion from adoption in that diffusion process occurs within society, while adoption occurs among individuals (Rogers, 2003). Diffusion theory categorizes consumers in five stages.
according to how fast they adopt new innovations or ideas. These five stages identify consumers as innovators, early adopters, early majority, late majority, and laggards. (Rogers, 2003) Figure 1 shows the distribution of these groups when a new technology is introduced.

![Rogers Adoption / Innovation Curve](www.valuebasedmanagement.net)

Figure 1. Five Stages of Diffusion Theory

Approximately 2.5 percent of the adopters are called "innovators". This group is likely to accept new ideas or buy products that are first introduced. The innovator plays an important role in the diffusion process as they create the flow of new ideas into a social system (Rogers, 1986)
Further, 13.5 percent of the adopters are “early adopters”. Early adopters are a more integrated part of the society than innovators yet early adopters have the greatest degree of opinion leadership in the society. Next in the process are termed early majority that are 34% of the population. Another 34% are considered late majority and finally 16% of the population are laggards that resist adopting an innovation until the end of the diffusion process (Rogers, 1986).

Diffusion theory suggests that innovations do not spread among mass population from the beginning. The general idea of the theory is that the most influential channel starts with a small number of innovators and moves to early adopters. (Value Based Management, 2008) Early adopters are also called opinion leaders and are essential in moving the new technology or fashion to the mainstream population. The new product if accepted by these five groups spreads to the early majority then the late majority followed lastly by laggards when the technology has been replaced by something new. Hence marketers need to address innovators and opinion leaders of cars to be successful with new-to-the-world products such as hybrid cars.
In the US, although hybrid sales keep growing every year, hybrids still made up only slightly more than one percent of the market in 2006 (Vlasic, 2008). Therefore, current hybrid car owners can be categorized as innovators. But JD Power predicts that the percentage will increase to 3% by 2010 (Green car congress, 2005). Thus, hybrid technology is about to move from the innovator stage to the early adopter stage. One factor in the diffusion of hybrid technology worldwide is awareness of global warming.

Global Warming

The growing awareness of global warming has had a significant impact on the automotive industry and various countries’ governments (Tadachi, 2008). Initiated by Toyota Prius, automotive manufactures started developing environmentally friendly vehicles to reduce greenhouse gas emissions during the last decade. Governments in developed countries legislated new policies and laws, such as setting emission standards for auto manufactures as well as providing incentives to hybrid owners to reduce CO2 emission from cars (Tadachi, 2008). These movements raised consumers’ awareness of global warming and increased their choices of cars.
The global average temperature near the earth's surface rose 0.74 ± 0.18 °C (1.33 ± 0.32 °F) during the 100 year period ending in 2005 (Intergovernmental Panel on Climate Change, 2007). Since the industrial revolution, especially after the 19th century, greenhouse gases, such as carbon dioxide and methane gas, have dramatically increased, a major cause of global warming (Intergovernmental Panel on Climate Change, 2007). Natural Resources Defense Council (2007) predicts that global warming will cause the following consequences:

- Melting glaciers, early snowmelt and severe droughts that will cause more dramatic water shortages in the American West,
- Rising sea levels will lead to coastal flooding on the Eastern seaboard, in Florida, and in other areas, such as the Gulf of Mexico,
- Warmer sea surface temperatures will fuel more intense hurricanes in the southeastern Atlantic and Gulf coasts,
- Forests, farms and cities will face troublesome new pests and more mosquito-borne diseases, and
- Disruption of habitats such as coral reefs and alpine meadows could drive many plant and animal
species to extinction. ("Global Warming Basics" National Resources Defence Council, 2007)

Despite the above predictions, countries are faced with difficult questions regarding the consequences of global warming such as ecosystems, civilization, and species distribution (Lindsay, 2001). However, it is certain that human activities such as burning fossil fuels and deforestation substantially contribute to increases in greenhouse gases that accelerate global warming (Lindsay, 2001). Preventing global warming is essential for human life but is not easy to implement. Some ways to reduce the effects of greenhouse gases include setting emissions standards, developing alternative energy sources to replace fossil fuels, reducing fossil fuel use, protecting areas from deforestation, and developing agricultural techniques that release less carbon dioxide into the atmosphere (Lindsay, 2001). Developing new technologies to reduce fossil fuel dependency would be one way, but critics have argued that the cost of implementing an effective program would be too high (Lindsay, 2001). However, the high demand for hybrid cars and other environmentally friendly technology demonstrates that eco-technology is feasible. Furthermore, it has raised
awareness of global warming and spurred the eco-movement among industries around the world.

Kyoto Protocol

The first international effort to address the greenhouse effect was the Kyoto Protocol (European Commission, 2007). To reduce global greenhouse gases emission, the Kyoto Protocol was ratified on December 11th, 1997 (Lindsay, 2001). The agreement was made under the United Nations Framework Convention on Climate Change (UNFCCC). One hundred seventy four countries ratified and adopted the protocol as of November 2007. These countries committed to reduce their emissions of carbon dioxide and five other greenhouse gases, and/or engage in emissions trading if they maintained or increased emissions.


"The Kyoto Protocol is an agreement under which industrialized countries will reduce their collective emissions of greenhouse gases by 5.2% compared to the year 1990 (but note that, compared to the emissions levels that would be expected by 2010 without the Protocol, this limitation represents a 29% cut). The goal is to lower overall emissions of six greenhouse
gases - carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons, and perfluorocarbons - averaged over the period of 2008-2012. National limitations range from 8% reductions for the European Union and some others to 7% for the US, 6% for Japan, 0% for Russia, and permitted increases of 8% for Australia and 10% for Iceland.” (United Nations Press Release, 1997)

Therefore, Kyoto Protocol is the agreement among developed countries to reduce greenhouse gases but critics claim that it has levied restrictions only on the developed nations and not on developing countries like China, India, and Brazil where the need is the greatest (Lindsay 2001). Furthermore, many points are unclear, such as whether emissions reduction is an absolute requirement, how to enforce the restrictions, and how to penalize noncompliant countries. (Lindsay, 2001). Also, the withdrawal of the US from the Kyoto Protocol dramatically weakened the meaning of the agreement as the US alone is responsible for about 25% of global carbon emissions.

Singapore and Kyoto Protocol

Since 1997, Singapore has been a party to the UN Framework Convention on Climate Change. However, the
country did not accede to the Kyoto protocol until 2006 due to difficulty changing from burning fossil fuels to renewable sources of energy or non-carbon alternatives to meet the energy needs of its growing population and economy (Ministry of the Environment and Water Resources, 2004). However, Singapore decided to accede to the Kyoto protocol in April 2006 for several reasons: 1) the financial sector could expand into the CO2 emission trading market; 2) 70% of the power generated for Singapore has already been changed to natural gas and has achieved high efficiency; and 3) reducing greenhouse emissions would not have a negative impact on economic growth (Ministry of the Environment and Water Resources, 2004). However, according to Ministry of the Environment and Water Resources (2007), Singapore produces 1% of world greenhouse gas emissions. From 1990 to 2004, CO2 per GDP was reduced 22%, and the government’s goal is to reduce emissions by 25% by 2012 compared to the level in 1990 (Ministry of the Environment and Water Resources, 2007).

Corporate Social Responsibility

Corporate social responsibility (CSR) is a concept with a growing demand around the globe. Although CSR does not have a universal definition, it is often regarded as
organizations considering the interests of society by taking responsibility for the impact of their activities on customers, employees, shareholders, communities and the environment in all aspects of their operations (Industry Canada, 2005).

Major CSR issues include stakeholder engagement, environmental management, labor standards, governance, community relations, social equity, responsible sourcing and human rights (CSRnetwork, 2008).

Corporate social responsibility has been gaining importance especially in the automotive industry as this industry has a great impact on society (Ameinfo.com, 2006). In emerging markets, such as Thailand, India, and China, the growth of the automotive sector plays an integral role in the economic and social development of their country by generating jobs and improving quality of life (Ameinfo.com, 2006). Another issue is that cars generate greenhouse gases that are the major cause of global warming and air pollution. Therefore, automotive manufactures need to improve fuel efficiency and develop alternative engines for sustainable society. Another way is to offset carbon emission. One example of an automotive company’s CSR initiative is VolksWagen’s plantation activity. VW America implemented the program to offset the
“carbon footprint” of people who buy new VWs from September 1 through January 2, 2008 (Edmunds inside line, 2007). In summary, VW plans to reforest land in the Lower Mississippi Alluvial Valley in Northern Louisiana that would achieve a total carbon reduction of more than 372,000 tons of carbon dioxide. Specially VW will plant more than a quarter-million native trees near their plant (Edmunds inside line 2007). Given their role in global warming, automotive manufacturers are involved in corporate social responsibility activities such as forestation to improve their green image among consumers (Carbonfund.org, 2007).

TNS (Ameinfo.com, 2006) found that among the global automotive corporations, BMW, Honda, Toyota, and Volvo Trucks ranked highest for corporate social responsibility in two or more markets. The study also showed that consumers worldwide tend to accept a corporation based on its reputation for social and environmental responsibility (Ameinfo.com, 2006). Nearly 90% of consumers indicated that they were more likely to purchase a product or service from a corporation with responsible business practices while 80% indicated that they would refrain from purchasing a product or service if the corporation failed to follow environmentally friendly or ethical business
practices (Ameinfo.com, 2006). Hence, it is essential for automobile companies to contribute to a sustainable society and communicate their CSR activities effectively.

Hybrid Cars

Hybrid cars are vehicles that run on two sources of power, conventional petrol and electricity. Hybrid cars are charged by movement of the wheels and store the kinetic energy through regenerative braking (Hybrid-car Organization, 2005). The technology reduces harmful emissions by up to 90% while dramatically reducing fuel consumption (Hybrid-car Organization, 2005). As well, hybrid cars provide economical benefits such as reducing gasoline expenses, providing tax rebates and, most importantly, producing less pollutants than traditional fuel cars.

Awareness of global warming and increased gas prices have made hybrid cars attractive to consumers. Toyota introduced the first commercial hybrid car, the Toyota Prius, in Japan in 1997, and introduced hybrids in USA, Europe and other countries in 2000 (Green Car Congress, 2008). Since then hybrid cars have became widespread globally with demand outpacing supply. In the US, since the introduction of the Honda Insight in 1999, cumulative
sales of hybrids reached more than 1,002,000 units (Green Car Congress, 2008). Specifically, sales of Toyota hybrids have skyrocketed from 18,000 in 1998 to 312,500 in 2006 (Msnbc, 2007). As Figure 2 shows, worldwide cumulative hybrid vehicle sales reached 1 million in May 2007. (Toyota Annual report, 2007) This movement has changed the industry, as nearly every major auto manufacturer has developed environmentally friendly technology to improve gas mileage and to cut emissions (Vlasic, 2008). As well, auto manufacturers started selling hybrid cars in developing countries.

![Cumulative Hybrid Vehicle Sales (Worldwide)](image)

Source: Toyota Annual Report 2007: Environment and Social Initiatives

Figure 2. Cumulative Hybrid Vehicle Sales of Toyota

**Hybrid Car Market in Singapore**

Both Toyota and Honda introduced hybrid cars in Singapore in 2006; however, sales have not been as
significant as in the US or Japan. According to Masaki Tadachi (2008), Deputy General Manager of Toyota Motor Asia Pacific PTE LTD, Toyota introduced the Prius in June 2006 and sold 67 units by December of that year. From January to October 2007, 78 units of the Prius were sold. In May 2006 Honda introduced the Civic Hybrid and sales reached 158 units by December 2006. Moreover, 136 units of the Civic Hybrid were sold between January to April 2007. According to Tadachi (2008), Honda achieved greater sales by selling the Civic Hybrid to its car rental company. And although Honda prices the Civic Hybrid about 17% cheaper than the Prius, low hybrid sales in Singapore might be attributed to low awareness of these models as well as global warming. Insufficient governmental incentives may also be inhibiting adoption of the hybrid.

**Governmental Incentives for Hybrid Cars in Singapore: Green Vehicle Rebate**

According to National Environment Agency (2002), the Green Vehicle Rebate (GVR) aims to change consumers’ behavior to becoming more environmentally friendly and to support clean emerging technologies by narrowing the cost differential between a green vehicle and an equivalent conventional model. In addition to the Certificate of Entitlement (S$11,000~$16,000) (Land Transport Authority,
Additional Registration Fees (ARF) are levied on all passenger vehicles. ARF is currently set at 110% of the Open Market Value (OMV) of the vehicle that includes the cost of the car and freight to Singapore (Hun, 2007). A portion of ARF is refunded to consumers when they declare non-operation of the vehicle within 10 years.

The Land Transport Authority sets the tax privilege for hybrid cars that is a rebate equivalent to 40% of the Open Market Value (OMV) that can be used to offset the Additional Registration Fee (Land Transport Authority, 2008). This means hybrid cars are levied only 70% of OMV for the ARF, instead of 110%. However, as the ARF rebate is calculated, hybrid car owners get the lower ARF refund, a tax saving privilege, but it is, in fact, not significant. Moreover, the Land Transport Authority imposes taxes according to the power of the vehicles, so hybrid cars are also levied for having more power. According to Huh (2007), driving Lexus RX 400h (Hybrid) in Singapore would incur an additional cost of $2,278 per year. This demonstrates that governmental incentives for owning eco-friendly hybrid cars may not be substantial enough to assist consumers with the purchase of a hybrid car.
CHAPTER THREE

METHODOLOGY

Introduction

Chapter Three describes the methodology employed in collecting data, explains the development of the instrument, and the sampling method used.

Population and Sample

The study sought to determine awareness of global warming, corporate social responsibility (CSR), hybrid cars, and attitudes toward cars among people living in Singapore. Two hundred sixteen individuals were randomly selected to participate in the survey. The sample consisted of 157 local residents mainly Chinese-Singaporean, and 59 non-local residents. The age distribution ranged from 18-64. However, the majority of the sample was drawn from those in their late 20’s to early 50’s. The largest age group was 35-44 representing 86 individuals, followed by 25-34 (70), 45-54 (33), 18-24 (16), and 55-64 (11).

Instrument

The questionnaire consisted of two sections. Section 1 was designed to measure respondents’ awareness of global warming, CSR, and hybrid cars, as well as their attitudes
towards purchasing a car. Questions 1, 2, 3, and 6 were measured via YES/NO response and included the following questions: “Do you own a car?”, “Do you plan to purchase a car in the next 5 years?”, “Have you ever purchased a hybrid car?”, and “Do you want to purchase a hybrid car?”. Question 4 was measured on a four point modified Likert scale. Respondents were asked to rate their awareness level of global warming and hybrid cars using the scale of “Know nothing” (1), “Know little”, “Fairly knowledgeable”, and “Very knowledgeable” (4). Questions 5 and 7 were also measured by a modified Likert scale from Very Unimportant (1) to Very Important (5). Respondents were asked to rate the importance of several factors (e.g., price, fuel efficiency) when purchasing a traditional fuel car and then a hybrid car.

Question 8 was measured by multiple choice questions; “If you are not interested in purchasing a hybrid car, could these factors change your mind? (Choose one only) for respondents who answered “No” in Question 6; “Do you want to purchase a hybrid car?” Respondents were required to choose from the following options: “Better gas mileage than a gasoline car”, “Competitive pricing”, “Wider variety in hybrid car models” and “More governmental privilege (rebate, tax saving)”
Section 2 of the questionnaire collected demographic information of respondents. Specifically, section 2 sought such information as gender, age, income, marital status, and ethnic background.

Data Analysis

After gathering all completed surveys, data were entered into the Statistical Program of Social Sciences (SPSS). Measures of central tendency and cross tabulations were used to analyze the data. Further, reliability of the instrument was also tested.
CHAPTER FOUR

FINDINGS

Introduction

Chapter four presents the findings regarding Singaporean consumers' awareness of global warming and hybrid cars, as well as attitudes towards purchasing such a car. The data were analyzed by Statistical Package for Social Science (SPSS) 13.0.

The results were divided by question and ordered accordingly. For each question, a description of general "face-value" data was given and implications of results were communicated. Cross-Tabulation analyses were subsequently conducted with demographic variables, such as gender, age, income, marital status, and ethnic backgrounds, and attitudes to determine trends.

Demographic Characteristics of Respondents

A random sample of 216 were surveyed and demographic characteristics of respondents are given in Table 1. More than half (58.3%) of the respondents were male and approximately three fourths ranged in age from 25 to 44 years of (72.2%). A majority (63.9%) of respondents' ethnic background was Chinese-Singaporean. The annual household income level distribution ranged from $15,000
SGD or less to $90,000 and over with the majority (47.3%) of respondents reporting annual incomes between $15,000 to $60,000 SGD. Over half (54.6%) of the respondents’ martial status was married with children.

Table 1. Demographic Characteristics of Respondents in Singapore

<table>
<thead>
<tr>
<th>N=216</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>126</td>
<td>58.3%</td>
</tr>
<tr>
<td>Female</td>
<td>90</td>
<td>41.7%</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-24</td>
<td>16</td>
<td>7.4%</td>
</tr>
<tr>
<td>25-34</td>
<td>70</td>
<td>32.4%</td>
</tr>
<tr>
<td>35-44</td>
<td>86</td>
<td>39.8%</td>
</tr>
<tr>
<td>45-54</td>
<td>33</td>
<td>15.3%</td>
</tr>
<tr>
<td>55-64</td>
<td>11</td>
<td>5.1%</td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$15,000 or less</td>
<td>17</td>
<td>7.9%</td>
</tr>
<tr>
<td>$15,001-30,000</td>
<td>36</td>
<td>16.7%</td>
</tr>
<tr>
<td>$30,001-45,000</td>
<td>41</td>
<td>19.0%</td>
</tr>
<tr>
<td>$45,001-60,000</td>
<td>25</td>
<td>11.6%</td>
</tr>
<tr>
<td>$60,001-70,000</td>
<td>19</td>
<td>8.8%</td>
</tr>
<tr>
<td>$70,001-80,000</td>
<td>17</td>
<td>7.9%</td>
</tr>
<tr>
<td>$80,001-90,000</td>
<td>10</td>
<td>4.6%</td>
</tr>
<tr>
<td>$90,001 and above</td>
<td>46</td>
<td>21.3%</td>
</tr>
<tr>
<td>Martial Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married with children</td>
<td>110</td>
<td>54.6%</td>
</tr>
<tr>
<td>Married without children</td>
<td>25</td>
<td>11.6%</td>
</tr>
<tr>
<td>Single, Never married</td>
<td>69</td>
<td>31.9%</td>
</tr>
<tr>
<td>Single with children</td>
<td>1</td>
<td>0.5%</td>
</tr>
<tr>
<td>divorced or widowed</td>
<td>2</td>
<td>0.9%</td>
</tr>
<tr>
<td>Ethnic Background</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chinese-Singaporean</td>
<td>130</td>
<td>63.9%</td>
</tr>
<tr>
<td>Malay-Singaporean</td>
<td>15</td>
<td>6.9%</td>
</tr>
<tr>
<td>Indian-Singaporean</td>
<td>4</td>
<td>1.9%</td>
</tr>
<tr>
<td>Mainland China</td>
<td>3</td>
<td>1.4%</td>
</tr>
<tr>
<td>Mainland Malaysia</td>
<td>17</td>
<td>7.9%</td>
</tr>
<tr>
<td>Mainland India</td>
<td>1</td>
<td>0.5%</td>
</tr>
<tr>
<td>Indonesian</td>
<td>3</td>
<td>1.4%</td>
</tr>
<tr>
<td>Philippine</td>
<td>1</td>
<td>0.5%</td>
</tr>
<tr>
<td>Japanese</td>
<td>29</td>
<td>13.4%</td>
</tr>
<tr>
<td>Korean</td>
<td>1</td>
<td>0.5%</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>1.9%</td>
</tr>
</tbody>
</table>
Reliability Analysis

The internal consistency of the scales of survey questions 4, 5 and 7 were assessed with the use of the Crobanch’s alpha. For Question 4, the value was 0.899 which indicates high reliability. The value of 0.692 was obtained for Question 5, which is adequate level of Crobanch’s alpha (NC state University 2008), considering that scales are made up of eight items. Finally, question 7, Crobanch’s alpha was 0.702.

Findings

The Singapore Respondents’ Car Ownership

Question 1: Do you own a car?

Table 2. Singaporean Car Ownership

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>YES</td>
<td>109</td>
<td>50.5</td>
<td>50.5</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>107</td>
<td>49.5</td>
<td>49.5</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>216</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Among respondents, a little over half (50.5%) owned cars (Table 2).

- Cross tabulations were conducted between car ownership and selected demographic variables
such as gender, income and marital status. Findings indicated that 62.7% of male respondents owned cars, while only 33.3% of females owned them. A majority of respondents whose annual income was above $30,001 Singapore dollars owned cars, while only around 20% of those with annual incomes below $30,000 owned them. Finally, 66.1% of respondents married with children own cars, whereas only 27.5% of single respondents own them.

**Question 2: Do you plan to purchase a car in the next 5 years?**

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>YES</td>
<td>107</td>
<td>49.5</td>
<td>49.5</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>109</td>
<td>50.5</td>
<td>50.5</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>216</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 3 shows that slightly less than half (49.5%) of respondents plan to purchase a car in the next 5 years. Cross-tabulations between Question 2 (Do you plan to purchase a car?) and demographic variables indicated that younger respondents had a
stronger desire to purchase cars than older ones. Specifically, 62.5% of respondents aged 18-24 and 57.1% of those 25-34 planned to purchase a car in the next 5 years. In contrast, less than half of the respondents over 35 years of age answered “yes” to this question. Approximately 45% of respondents age between 35-44, 39.4% of 45-54, and 45.5% of 55-64 answered “yes” to this question; however this can be attributed to the higher percentage of car ownership of respondents over 35 than of those under 35. Further, less than half of the Chinese (46.4% of Chinese-Singaporean and 33.3% of mainland Chinese) respondents planned to purchase cars in the next 5 years, while a majority of Malay respondents (53.3% of Malay-Singaporean and 64.7% of mainland Malaysian) planned to purchase them in the future.
Question 3: Have you ever purchased a hybrid car?

Table 4. Purchased a Hybrid Car?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>YES</td>
<td>2</td>
<td>.9</td>
<td>.9</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>214</td>
<td>99.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>216</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Less than 1% of respondents purchased a hybrid car.

Awareness Level of Global Warming

Question 4: Please check the following issues you are aware of.

Table 5. Awareness of the Causes of Global Warming

<table>
<thead>
<tr>
<th>Know nothing</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Know little</td>
<td>58</td>
<td>26.9</td>
<td>26.9</td>
<td>32.9</td>
</tr>
<tr>
<td>Fairly knowledgeable</td>
<td>120</td>
<td>55.6</td>
<td>55.6</td>
<td>88.4</td>
</tr>
<tr>
<td>Very Knowledgeable</td>
<td>25</td>
<td>11.6</td>
<td>11.6</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>216</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
Table 6. Awareness of the Impact of Global Warming on Society

<table>
<thead>
<tr>
<th>Valid</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Know nothing</td>
<td>20</td>
<td>9.3</td>
<td>9.3</td>
<td>9.3</td>
</tr>
<tr>
<td>Know little</td>
<td>55</td>
<td>25.5</td>
<td>25.6</td>
<td>34.9</td>
</tr>
<tr>
<td>Fairly knowledgeable</td>
<td>115</td>
<td>53.2</td>
<td>53.5</td>
<td>88.4</td>
</tr>
<tr>
<td>Very Knowledgeable</td>
<td>25</td>
<td>11.6</td>
<td>11.6</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>215</td>
<td>99.5</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Missing System</td>
<td>1</td>
<td>.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>216</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 7. Awareness of the Kyoto Protocol

<table>
<thead>
<tr>
<th>Valid</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Know nothing</td>
<td>68</td>
<td>31.5</td>
<td>31.5</td>
<td>31.5</td>
</tr>
<tr>
<td>Know little</td>
<td>73</td>
<td>33.8</td>
<td>33.8</td>
<td>65.3</td>
</tr>
<tr>
<td>Fairly knowledgeable</td>
<td>62</td>
<td>28.7</td>
<td>28.7</td>
<td>94.0</td>
</tr>
<tr>
<td>Very Knowledgeable</td>
<td>13</td>
<td>6.0</td>
<td>6.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>216</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
Table 8. Awareness of Governmental Policy on Global Warming

N=216

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid Know nothing</td>
<td>40</td>
<td>18.5</td>
<td>18.5</td>
<td>18.5</td>
</tr>
<tr>
<td>Know little</td>
<td>103</td>
<td>47.7</td>
<td>47.7</td>
<td>66.2</td>
</tr>
<tr>
<td>Fairly knowledgeable</td>
<td>64</td>
<td>29.6</td>
<td>29.6</td>
<td>95.8</td>
</tr>
<tr>
<td>Very Knowledgeable</td>
<td>9</td>
<td>4.2</td>
<td>4.2</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>216</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

As shown in Tables 5 and 6, respondents were fairly knowledgeable regarding global warming, its causes and impact on society. Specifically, 67.1% of respondents were either fairly or very knowledgeable about the causes of global warming, and 65.1% were either fairly or very knowledgeable of its impact on society.

On the other hand, a majority answered either "know nothing" or "know little" about the Kyoto Protocol or the government’s policy on global warming (Tables 7 & 8). Most respondents (33.8% and 47.7% respectively) had little knowledge of the Kyoto protocol and governmental policy.
Awareness Level of Hybrid Cars

Table 9. Awareness of Hybrid Cars

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Know nothing</td>
<td>37</td>
<td>17.1</td>
<td>17.1</td>
<td>17.1</td>
</tr>
<tr>
<td>Know little</td>
<td>92</td>
<td>42.6</td>
<td>42.6</td>
<td>59.7</td>
</tr>
<tr>
<td>Fairly knowledgeable</td>
<td>77</td>
<td>35.6</td>
<td>35.6</td>
<td>95.4</td>
</tr>
<tr>
<td>Very Knowledgeable</td>
<td>10</td>
<td>4.6</td>
<td>4.6</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>216</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

As Table 9 indicates, over half (59.7%) of respondents answered either “Know nothing” or “Know little” about hybrid cars.

Cross tabulations were done regarding this question and selected demographics. Findings indicated that respondents between 18-24 had the lowest level of awareness. Specifically, 43.8% of the 18-24 year olds answered “know nothing” about hybrid cars, and 31.3% of them knew little about them. In contrast, the oldest age group (55-64) showed the highest awareness level of hybrid cars. Specifically, 54.6% of the 55-64 year olds answered either “Fairly knowledgeable” or “Very knowledgeable” regarding them.
Regarding gender differences and car awareness, male respondents were more aware of them than females. Specifically, 36.7% of female respondents answered “know nothing” about hybrid cars, while only 3.2% of male respondents answered “know nothing”.

Regarding ethnic differences, the Japanese had the highest awareness of hybrid cars. Three fourths (75.9%) of Japanese were either “Fairly knowledgeable” or “Very knowledgeable” of hybrid cars. By contrast, most other ethnic groups studied indicated that either they “know nothing” or “know little” about hybrids. For example, only 35.2% of Chinese-Singaporean answered either “Fairly knowledgeable” or “Very knowledgeable”.

36
Awareness Level of Corporate Social Responsibility

Table 10. Awareness of Corporate Social Responsibilities

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid Know nothing</td>
<td>63</td>
<td>29.2</td>
<td>29.2</td>
<td>29.2</td>
</tr>
<tr>
<td>Know little</td>
<td>102</td>
<td>47.2</td>
<td>47.2</td>
<td>76.4</td>
</tr>
<tr>
<td>Fairly knowledgeable</td>
<td>45</td>
<td>20.8</td>
<td>20.8</td>
<td>97.2</td>
</tr>
<tr>
<td>Very Knowledgeable</td>
<td>6</td>
<td>2.8</td>
<td>2.8</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>216</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Table 10 shows that 76.4% of respondents “Know nothing” or “Know little” about corporate social responsibilities (CSR) of car manufacturers.

Cross tabulations with CSR and age revealed that awareness of CSR is proportionate to it. As age increases, awareness level of CSR increases as well. Only 12.5% of respondents age 18-24 were “Fairly knowledgeable”, while 45.6% of 55-64 respondents were either “Fairly knowledgeable” or “Very knowledgeable”.

Consumers’ Attitudes towards Cars

Question 5: When you purchase a car, how important are these criteria?
Question 5 asked respondents to rate the importance of selected criteria (e.g.; price, safety) when purchasing a car.

Results indicated that the most important criteria were safety followed by price and fuel efficiency. The least important factor was auto manufacturers' corporate social responsibility. Table 11 shows the criteria influencing respondents' car purchasing behavior in descending order of importance.

Table 11. Summary of Question 5; Factors Influencing Consumers' Car Purchasing Behavior

<table>
<thead>
<tr>
<th>Factors</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Freq.</td>
<td>%</td>
<td>Freq.</td>
<td>%</td>
<td>Freq.</td>
<td>%</td>
</tr>
<tr>
<td>Safety</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>5.6</td>
</tr>
<tr>
<td>Price</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0.5</td>
<td>4</td>
<td>1.9</td>
</tr>
<tr>
<td>Fuel Efficiency</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0.5</td>
<td>23</td>
<td>10.6</td>
</tr>
<tr>
<td>Design</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1.4</td>
<td>43</td>
<td>19.9</td>
</tr>
<tr>
<td>Size</td>
<td>2</td>
<td>0.9</td>
<td>6</td>
<td>2.8</td>
<td>58</td>
<td>26.9</td>
</tr>
<tr>
<td>Brand</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>5.6</td>
<td>56</td>
<td>25.9</td>
</tr>
<tr>
<td>Clean engine</td>
<td>0</td>
<td>0</td>
<td>22</td>
<td>10.2</td>
<td>82</td>
<td>38</td>
</tr>
<tr>
<td>CSR</td>
<td>3</td>
<td>1.4</td>
<td>30</td>
<td>13.9</td>
<td>93</td>
<td>43.1</td>
</tr>
</tbody>
</table>

1---Very unimportant
2---Unimportant
3---Neither important nor unimportant
4---Important
5---Very important

Approximately 94 percent of respondents felt "safety" was either "Very important" or "Important" when purchasing
a car. Further most respondents (43.1%) felt CSR was neither an important nor unimportant factor when purchasing a car. On the other hand, almost the same number of respondents (41.7%) felt CSR was either "Important" or "Very important."

Question 6: Do you want to purchase a hybrid car?

Table 12. Demand for Hybrid Cars

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>YES</td>
<td>91</td>
<td>42.1</td>
<td>42.1</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>125</td>
<td>57.9</td>
<td>57.9</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>216</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

As Table 12 shows, a majority of people (57.9%) did not want to purchase a hybrid car.

Cross tabulations were conducted to determine the influence of demographic characteristics and demand for hybrids. Regarding age 63.6% of respondents between the ages of 55-64 were the most interested in purchasing a hybrid. By contrast, the 25-34 age group showed the least interest in purchasing a hybrid car while only 37.1% considered them.
• Half of the respondents (50%) with annual household incomes over SD $80,001 would consider buying a hybrid. However, only 30.6% of respondents with an income below SD$30,000 wanted to purchase one.

• Regarding ethnicity and purchasing a hybrid, 69% of Japanese desired to followed by Malaysian (both Singaporean and mainland) (47%), and Chinese (both Singaporean and mainland) (around 36%). Indian respondents (both Singaporean and mainland) indicated no interest in purchasing one.

Question 7: When you purchase a hybrid car, how important are these factors?

This question was only answered by 91 respondents who answered “Yes” in Question 6; “Do you want to purchase a hybrid car?”.

Findings indicated that the most important criteria when purchasing a hybrid car was “Fuel efficiency” followed by “Price”. The least important factor was “Personal responsibility over global warming”. Table 13 shows the factors influencing respondents’ purchasing behavior of hybrid cars in descending order of importance.
Table 13. Factors Influencing Consumers’ Purchasing Behavior of Hybrid Cars

<table>
<thead>
<tr>
<th>Factors</th>
<th>1 Freq. %</th>
<th>2 Freq. %</th>
<th>3 Freq. %</th>
<th>4 Freq. %</th>
<th>5 Freq. %</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel Efficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>46.5</td>
</tr>
<tr>
<td>Governmental Privileges</td>
<td>1</td>
<td>1.1</td>
<td>1</td>
<td>3</td>
<td>3.3</td>
<td>4.396</td>
</tr>
<tr>
<td>Personal Responsibility Over</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global Warming</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1---Very unimportant
2---Unimportant
3---Neither important nor unimportant
4---Important
5---Very important

Almost all (95.6%) respondents felt fuel efficiency was either "Very important" or "Important" factor when purchasing a hybrid car. On the other hand, 76.9% regarded personal responsibility over global warming, "Very important" or "Important".

Question 8: If you are not interested in purchasing a hybrid car, could these factors change your mind?
(Choose one only)

This question was only answered by 126 respondents who answered "No" in Question 6; "Do you want to purchase a hybrid car?" to help the researcher discover what factors currently prevented customers from purchasing a hybrid car.
Table 14. Factors which Could Change Consumers’ Mind to Purchase a Hybrid Car

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Better gas mileage than gasoline car</td>
<td>17</td>
<td>13.5</td>
<td>13.5</td>
</tr>
<tr>
<td>Competitive pricing</td>
<td>47</td>
<td>37.3</td>
<td>50.8</td>
</tr>
<tr>
<td>Wider variety in hybrid cars model</td>
<td>18</td>
<td>14.3</td>
<td>65.1</td>
</tr>
<tr>
<td>More governmental privilege</td>
<td>44</td>
<td>34.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>126</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Missing System</td>
<td>90</td>
<td></td>
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<tr>
<td>Total</td>
<td>216</td>
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Table 14 shows two important factors. Over one third (37.3%) of respondents who did not want to purchase a hybrid car felt more “competitive pricing” would change their mind, while 34.9% of them believed “more governmental privileges” would change it.
Discussion and Implications

The research sought to measure consumer awareness of global warming and attitudes towards hybrid cars in Singapore. Two hundred and sixteen respondents completed the survey where the majority were male between the ages of 25 and 44. Most respondents' annual household income was between SD$15,000-$45,000 and were married. Finally, half of the respondents owned a car.

The findings showed great demand for cars in Singapore, especially among young people. Meanwhile, the findings also suggested that consumers have a low awareness level of hybrid cars and corporate social responsibility (CSR).

Awareness Level of Global Warming, Hybrid Cars and Corporate Social Responsibility

Awareness Level of Global Warming. Awareness of global warming has had a great impact on the automotive industry and consumers especially in developed countries. However, the findings indicated slow hybrid sales were attributed to lack of awareness of them and the Kyoto Protocol.
Results showed that the majority knew basic information about global warming, such as causes and the impact on society; however, most were not knowledgeable regarding Kyoto Protocol and Governmental policy over global warming. Therefore, marketers could emphasize hybrid’s environmental benefit in accordance with the Kyoto Protocol in their advertising strategy. Further, since respondents knew about global warming, advertisers could incorporate this in their message regarding the various benefits of the car.

**Awareness Level of Hybrid Cars.** Over half had little knowledge regarding hybrids and their role in reducing global warming. Findings indicated that especially awareness level is low among young generation. Specifically, 43.8% of the 18-24 year olds answered “know nothing” about hybrid cars. Also findings showed low awareness level among females. Almost 37% of female respondents answered “know nothing” about hybrid cars.

Hence, marketers need to raise awareness of hybrid cars, communicating both environmental and economical benefits. Further, marketers might incorporate the environmental message about hybrid cars especially among young people, since results showed that they were unaware of their benefits. As future purchasers of cars this
target market would propel sales of hybrid if informed of their environmental benefits. Moreover, marketers could plan the marketing strategy to raise awareness of hybrid cars among female consumers since they are a considerable influence on decision makers, especially among families.

**Awareness Level of Corporate Social Responsibility.**
One of the major implications of the study is the need to raise the awareness of corporate social responsibility (CSR) of auto manufacturers and how important that is in consumers' decision-making process. Over three fourths (76.4%) of respondents "Know nothing" or "Know little" about corporate social responsibilities of auto manufacturers in Singapore.

On the other hand, in other developed countries, nearly 90% of consumers indicated that they were more likely to purchase a product or service from a corporation with responsible business practices while 80% indicated that they would refrain from purchasing a product or service if the corporation failed to follow environmentally friendly or ethical business practices (Ameinfo.com 2006). This indicates that Singapore consumers lagged behind other countries regarding their understanding of CSR. Therefore, auto marketers might promote and communicate their CSR to consumers in
Singapore, which could differentiate and enhance their brand equity, and would increase sales in the long run.

Finding showed low awareness level of CSR among the young generation. However, as CSR may become a factor for choosing one automaker over another, marketers could promote their CSR activities to this segment since they are future owners and have a high desire to purchase a car in the next few years.

**Attitudes toward Purchasing a Car**

Findings indicated that consumers who would most probably purchase a car are consumers with annual incomes above SD$30,000 and who are between 18 to 34 years of age. The results also indicated that male consumers have a stronger desire to own cars than females. This segment would be the main target for automakers, hence, marketers should conduct research to know their specific needs and reflect them in product development and advertising strategy.

Further, results indicated that the top three important criteria when purchasing a car were price, safety and fuel efficiency. Therefore, communicating these important features and benefits effectively to the target market is critical to increased sales and ultimately increased market share for auto manufacturers.
The fact that only 20% of respondents whose income was below SD$30,000 owned cars reflects the high cost of purchasing a vehicle in Singapore. Auto manufacturers could offer competitive pricing for those segments to increase market share. Also they should communicate the features that promote safety and fuel efficiency. Price promotions such as rebates would also be effective in increasing car ownership.

The fact that respondents married with children show the highest rate of car ownership (71.6%) indicates that these families seek the convenience of driving a car compared to using public transportation. Therefore, automakers should promote the family-friendliness of their cars.

Consumers' Attitudes towards Hybrid Cars

Findings showed that less than one percent of respondents have purchased a hybrid car. This indicates that hybrid cars have not diffused in the marketplace and are still in the introductory stage in Singapore. Also, findings revealed that the majority of respondents (57.9%) did not want to purchase a hybrid car particularly among those 25 to 34 years of age.

Findings indicated that consumers who would most probably purchase a hybrid car are consumers with annual
incomes above SD$80,000 and who are between 55 to 64 years of age.

Over two-thirds of respondents between the ages of 55-64 were the most interested in purchasing a hybrid car. The fact that this segment showed the highest awareness of hybrid cars, global warming, and CSR, could testify that targeting marketing efforts to them would yield the greatest opportunity for sales of hybrids.

Furthermore, findings revealed incentives that may stimulate purchase included "Competitive pricing" and "More government privileges". Currently hybrid cars are too expensive and government incentives or privileges are not great enough to support their purchase.

As discussed in Chapter 2, the Land Transport Authority sets the tax privilege for hybrid cars that is a rebate equivalent to 40% of the Open Market Value (OMV) that can be used to offset the Additional Registration Fee (Land Transport Authority, 2008). However, this "Green Vehicle Rebate" is not significant to consumers because owing a car in Singapore has been made very expensive purposely by the government to control traffic. Also, the Singapore government encourages car owners to scrap or export their vehicle within 10 years after registration (Land Transport Authority, 2008). Therefore, in addition
to limited governmental privileges for hybrid car owners, the amount of money saved by paying less for petrol within the 10-year period may not cover the extra cost of purchasing a hybrid car.

Hence, some consumers are not motivated to purchase hybrid cars; perhaps automakers should work with the Singapore government to improve incentives for their purchasing. For example, extending the period that car owners can receive rebates from 10 years to 15 years regarding the Green Vehicle Rebate might stimulate hybrid car sales. Moreover, reduction of the Singapore road tax in addition to the electronic road tax to hybrid owners may increase sales. As competition increases in Singapore with a greater variety of car selections, social responsibility will become a factor for choosing one automaker over another. Therefore, automakers should be socially responsible with helping Singapore and its residents and communicate these efforts to the government to bring about changes in various car policies and taxes.

Also, findings suggested that among potential consumers who want to purchase hybrid cars, the most important factor was fuel efficiency. Therefore automakers should keep improving fuel efficiency and communicate its
economical benefits effectively through various media channels such as the Internet and television.

Another implication might include, providing government and the public sector with hybrid cars at deeply discounted rates to encourage support of these cars. As Singapore government acceded to the Kyoto protocol (Ministry of the Environment and Water Resources, 2004), it would be important for them to maintain clean image and show the effort to combat global warming. Use of hybrid cars as the government’s public cars such as patrol cars, taxis, buses, and military vehicles would raise awareness and acceptance of hybrid cars among consumers through exposure.

Future Research

This study had several limitations. First, the significance of external factors influencing the purchase of cars, such as high import tax and electronic road-pricing system, is greater than those in other countries. Therefore, the findings cannot be simply compared with other countries. Second, the sample consisted of only 216 respondents. A larger sample could be collected so that data can verify the findings. Third, the sample revealed a slight inconsistency with the actual
distribution of ethnic backgrounds in Singapore. For example, Indian-Singaporean in the sample account for only 1.9%, however the actual proportion of Indian-Singaporean is 8.8% according to government statistics. Consistency with actual ethnic distribution in collecting data would bring more accurate data findings.

Future Research should attempt to overcome the limitations discussed above and replicate the study. Furthermore, the direct relationship between government incentives for hybrid owners and sales, as well as, the effect of awareness of global warming on hybrid sales could be considered in future research to further define their relationships.
This research is prepared for fulfillment of the MBA degree at California State University, San Bernardino. The study examines the relationship between consumer awareness of global warming and car purchasing behavior.

Your responses will remain confidential. Please circle the option that best matches your response.

Section 1
Please circle the number that best corresponds to your response.

1. Do you own a car? 1. YES 2. NO
2. Do you plan to purchase a car in the next 5 years? 1 2
3. Have you ever purchased a hybrid car? 1 2

4. Please check the following issues you are aware of.
   Please use the following guide in your responses.
   1…Know nothing
   2…Know little
   3…Fairly knowledgeable
   4…Very knowledgeable

   About Global Warming
   Causes 1 2 3 4
   Impact on the society 1 2 3 4
   International agreement (Kyoto Protocol) 1 2 3 4
   Governmental policy 1 2 3 4

   About Other issues
   Hybrid car 1 2 3 4
   Auto manufacturer’s green activity (Corporate Social Responsibility) 1 2 3 4

5. When you purchase a car, how important are these criteria? For each item, please circle one.

   Please use the following guidance
   1…Very unimportant
   2…Unimportant
   3…Neither important nor unimportant
   4…Important
   5…Very important

   Price 1 2 3 4 5
   Fuel efficiency 1 2 3 4 5
   Safety 1 2 3 4 5
   Design 1 2 3 4 5
   Size 1 2 3 4 5
   Brand 1 2 3 4 5
   Company’s Corporate Social Responsibility activities (CSR) 1 2 3 4 5
   Clean engine (Hybrid etc.) 1 2 3 4 5

6. Do you want to purchase a hybrid car? 1 (Go to Q7) 2 (Go to Q8)
7. When you purchase a hybrid car, how important are these factors? For each item, please circle one.

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<th></th>
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</thead>
<tbody>
<tr>
<td>Personal responsibility over global warming</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Price</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Fuel Efficiency</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Governmental privilege (rebate, tax saving)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

8. If you are not interested in purchasing a hybrid car, could these factors change your mind? (Choose one only)

1. Better gas mileage than gasoline car
2. Competitive pricing
3. Wider variety in hybrid cars model
4. More governmental privilege (rebate, tax saving)
5. Other __________________

Section 2
Please circle the number that best corresponds to your response.

1. Gender
   1. Male
   2. Female

2. Which age group below best represents your current age?
   1. 18-24
   2. 25-34
   3. 35-44
   4. 45-54
   5. 55-64
   6. 65-74
   7. 75-84
   8. 85 and older

3. What was your annual gross household income for 2007 (in Singapore Dollars)?
   1. $15,000 or less
   2. $15,001-30,000
   3. $30,001-45,000
   4. $45,001-60,000
   5. $60,001-70,000
   6. $70,001-80,000
   7. $80,001-90,000
   8. $90,001 and above

4. Marital Status
   1. Married with children
   2. Married without children
   3. Single, never married
   4. Single with children
   5. Divorced or widowed

5. What is your ethnic background?
   1. Chinese-Singaporean
   2. Malay-Singaporean
   3. Indian-Singaporean
   4. Mainland China
   5. Malaysian
   6. Mainland India
   7. Indonesian
   8. Philippine
   9. Japanese
   10. Korean
   11. Thai
   12. American
   13. British
   14. French
   15. Multi racial
   16. Other

Thank you for your cooperation!
REFERENCES


Chun-Hsiung, J.C. (2006). The Different Perceptions Toward Hybrid Vehicles Between United States and China. Project presented to the faculty of CSUSB. P.4-10


Tadachi, M. Deputy General Manager, Toyota Motor Asia Pacific PTE LTD. Interviewed on January 10, 2008.


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