Honda’s Leadership Dilemma: Descriptive Analysis of Eco-friendly Vehicles Commercialization Strategies

Majid A. Dehkordi  
Starlight Group, Tokyo, Japan  
Graduate School of Commerce and Management,  
Hitotsubashi University, Tokyo, Japan  
dehkordi@ut.ac.ir

Seiichiro Yonekura  
Graduate School of Commerce and Management,  
Hitotsubashi University, Tokyo, Japan  
yonekura@iir.hit-u.ac.jp

Abstract: Purpose – This study addresses the eco-friendly vehicles commercialization strategies of Honda in the past two decades. The key influential factors associated with Honda’s EV development from 1996 to 2003, as well as EV project’s co-relation with the company’s HEV development will be discussed. In addition, this study seeks to explain the leadership dilemma of Honda in green vehicles production.

Design/methodology/approach – A descriptive case study approach has been used to provide an insight into Honda’s eco-friendly projects from the mid-90s. In this regard, two recognized generations of EV and HEV development from 1996 to 2012 have been analyzed.

Findings – In contrast to technology marketing studies, this study claims that Honda’s historical approach toward the eco-friendly vehicles commercialization has been a conservative one, which holds the company’s tendency to be an environmental leader rather than a market leader. Furthermore, the findings demonstrate Honda’s product cannibalization in eco-friendly vehicles production.

Originality/value – This research makes a few contributions: First, the authors could identify the contextual factors which affected the market acceptance of eco-friendly vehicles in the late 90s and the early 2000s. Second, they provide an in-depth insight into the Honda’s marketing and production of eco-friendly vehicles. And as a major contribution, they show that Honda’s historical path has mainly been focused on being the frontline of Fuel efficiency and Emission control issues.

Keywords- Honda, Leadership dilemma, Electric Vehicles (EVs), Hybrid Electric Vehicles (HEVs), Commercialization strategies

1. INTRODUCTION

For more than a hundred years, mankind has been using vehicles propelled by combustion engines. Stopping the growth in motor vehicle use is neither feasible nor desirable, given the economic and other benefits of increased mobility. Over the next 40 years the global fleet of passenger cars is expected to quadruple to nearly 3 billion (economist, 2009). The challenge, then, is to manage the growth of motorized transport so as to maximize its benefits while minimizing its adverse impacts on the environment and on society (Faiz et al., 1996). Indeed, car manufacturers have already introduced many options in order to build tomorrow’s eco-friendly cars. From the development of LNG propelled vehicles to the production of technically higher efficiency vehicles. Today, Electric vehicles and Hybrid Electric Vehicles are considered, by some, to be the solution to those problems.

Eco-friendly vehicles came into sight in the late 90s, largely produced by auto manufacturers to meet Zero Emission Vehicle (ZEV) standards in California. In the early 1990s, due to the huge need for rapid energy saving technologies, California Air Resource Board (CARB) regulated a law to promote the use and production of zero emission vehicles. Production of green vehicles, with lower fuel consumption and CO2 emission, hugely affected the metropolitan areas and their production was largely welcomed by positive acceptance, especially in Japan and US.

The study will provide a great insight into how eco-friendly vehicles could be commercialized and adopted, and how they could be commercialized in other ways to be more successful in the future. In addition, the Leadership dilemma and Product cannibalization of Honda Motor Company will be discussed. We will show that similar to Toyota, Honda chose a strategic plan to promote HEV rather than EV. The same time that Toyota started its Prius family production, Honda came forward with Insight Hybrid and followed Toyota in HEV production. After 1990, both of the companies were focused on both HEV and EV development. Toyota introduced RAV4 EV in 1997 and Honda introduced EV Plus in the same year. Later, with the introduction of hybrid technology, Toyota and Honda pulled their EVs from the market.
and stopped further production. After that, Honda also produced Civic Hybrid and Accord Hybrid which both got a huge acceptance in the market. Honda so far is known as a strategic fast follower of Toyota.

In order to investigate Honda’s leadership dilemma and green vehicle development strategies, we have chosen descriptive case study as our main research approaches. There are a few main reasons for the choice of case study. One of the reasons is case study provides a detailed contextual analysis of a complex phenomenon. Contextualization is important because it provides a greater understanding as to how an issue occurs and develops. In other words, it is impossible to see the full picture unless a detailed contextual analysis is conducted. Yin (1984, p.23) defines the case study research method as “an empirical enquiry that investigates a contemporary phenomenon within its real life context; when the boundaries between the phenomenon and context are not really clearly evident; and in which multiple sources of evidence are used.” The second reason in the use of case study method is, case study complements the limitations of quantitative methods and satisfy the three tenets of the qualitative method namely: describing, understanding, and explaining (Ibid).

The structure of this study is as follows: in the next chapter, the concept of Leadership will be more discussed. Then, the Honda’s historical background and its long term experience with vehicle engines will be explained. The final remarks, Honda’s leadership dilemma and a discussion will be presented in the final section.

II. MARKET OR ENVIRONMENTAL LEADERSHIP

Prior to the arguments in the next section, we would like to differentiate two terms that sometimes are mistaken in the literature: Market Leadership and Environmental Leadership. Based on Rouse (2007), Market leadership is the position of a company with the largest market share or highest profitability margin in a given market for goods and services. Market share may be measured by either the volume of goods sold or the value of those goods. Cooper and Nakanishi (1988) wrote in this era of intense competition, business firms of all sizes and varieties have become more and more concerned with the market share figures they achieve in the marketplace. They continue that maintaining the market share leadership in a new, growing industry will automatically assure a firm the largest experience, and therefore the lowest production and marketing costs.

In contrast, the Environmental Leadership concept of Dechant and Altman (1994) put the emphasis on getting a competitive advantage through approaching environmental issues. Consistent with the above definition, Gordon and Berry (2006) defined environmental leaders as those who are capable of solving environmental problems. We generalize this term for the companies that are establishing strategies and developing technologies to address the environmental issues, CO2 emission, global warming, etc. Figure 1 shows a schematic diagram of environmental leadership.

![Figure 1. Environmental leadership (ELIAS, 2007)](image_url)

III. HONDA’S HISTORICAL BACKGROUND, A LEAP FROM MOTORCYCLE TO VEHICLE

Honda Motor Company was founded by Soichiro Honda in 1948 and since 1959 it has been the world’s largest Motorcycle manufacturer. As a result, Honda has gained large benefits of economies of scale in internal combustion engines because of its motorcycle and power product businesses. Currently, it is the largest engine manufacturer in the world, with annually eleven million units for its product line and to sell to other companies. As far as the main markets, it should be mentioned that total automobile demand in Japan is declining and it is not just the vehicle market, but the
market as a whole. Some reasons for that happening is that the Japanese market is affected by declining birthrates, aging population and shifting consumer preferences. The United States is one of the advanced countries with a growing population, and it is expected to have a stable growth in the automobile market. This makes sense when we found out that in 2001, North America accounted for 57.3% of the total revenue of Honda.

Honda’s green production (electrification) started in the early 1990s and the starting cause was the Californian law makers. California Air Resource Board’s (CARB) regulations were issued in Sep 1990 in the US, state of California and it was to take effect in 1998. A law, called ZEV mandate I which required car companies to sell a certain percentage of zero emission vehicles each year (initially 2 percent of the total number of car sales). Same as other auto manufacturers and even more importantly, to be able to keep its main market, Honda responded to CARB ZEV I by starting its green transition and R&D investments on EV development projects. The first practical outcome of Honda’s hasty projects was EV-X which was the first EV of Honda. The company initiated this project in 1991, and exhibited the concept model in 1993 at the Tokyo Motor Show. This work made the base for all of Honda’s future green vehicles. Table 1 shows the main green vehicles of Honda, produced in the past two decades.

<table>
<thead>
<tr>
<th>Insight I HEV</th>
<th>Insight II HEV</th>
<th>Civic I HEV</th>
<th>Accord I HEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-door hatchback</td>
<td>5-door hatchback</td>
<td>4-door sedan</td>
<td>4-door sedan</td>
</tr>
<tr>
<td>Sale ($18,880)</td>
<td>Sale (~$19,800)</td>
<td>Sale ($20k)</td>
<td>Sale ($32k)</td>
</tr>
<tr>
<td>NiMH</td>
<td>NiMH</td>
<td>NiMH</td>
<td>NiMH</td>
</tr>
<tr>
<td>FCX Clarity II EV</td>
<td>EV plus</td>
<td>FCX EV</td>
<td>EV-X</td>
</tr>
</tbody>
</table>

| 4-door sedan  | 4-seat sedan| 2-door hatchback | 2-door hatchback |
| Lease (600$/mth) | Lease (455$/mth) | Test, Lease | Test |
| NiMH         | Fuel Cell   | NiMH       | NiMH         |

<table>
<thead>
<tr>
<th>Fit HEV</th>
<th>CR-Z HEV</th>
<th>Accord II PHEV</th>
<th>Fit EV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compact truck</td>
<td>5-door CUV</td>
<td>4-door sedan</td>
<td>4-door hatchback</td>
</tr>
<tr>
<td>Lease</td>
<td>Test, Lease (2500$/mth)</td>
<td>Sale ($40k)</td>
<td>Lease (260$/mth)</td>
</tr>
<tr>
<td>NiMH</td>
<td>Li-ion</td>
<td>Li-ion</td>
<td>Fuel cell</td>
</tr>
</tbody>
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Table 1., Green vehicles of Honda from 1990 - 2012

From the early 90s until present, Honda has produced five models of EVs as well as seven models of HEVs. The difference is that none of Honda’s EV projects ended up with mass production or any success in the market. For example, EV-X (1993) was a test model; only 340 units of EV Plus (1997 - 1999) were made and leased; only 30 units of FCX EV (2002) were made and were only for lease. In fact, FCX EV was the base technology for FCX Clarity EV (2009 - present), and based on the reports, only 200 units of Clarity were made and are currently leased. Honda announced that its mass production is scheduled to start from 2018. Also, Honda has produced 1100 units of Fit EV (2013 - present) only for a limited lease.

On the other hand, most of Honda’s produced HEVs such as Insight I (1999 - 2006), Civic (2001 - present), Accord (2005 – 2007), Insight II (2008 - present), Fit Hybrid (2010 - present), and CR-Z (2010 - present) have gained a
huge reputation and market acceptance. This condition even caught the scholars’ attention, as Burgelman and Schifrin (2008) wrote Honda, the large Japanese manufacturer and hybrid EV evangelist appears uncommitted to pursuing an EV strategy and does not plan to roll out mini-EVs until 2015. Meanwhile, Honda has continued its commitment in HEV production until recently, which it took EV more seriously and has invested hugely on EV technology R&Ds.

Motoatsu Shiraishi, Honda’s director in charge of environment, confirmed that “Honda will pursue higher efficiency in internal-combustion engines, which are today’s mainstream engine technology and as such represent the greatest near-term opportunity for reducing our environmental impact on a global scale” (Honda environmental report, 2006).

Honda started its EV development project with EV-X (1993) in US, California. Kenji Matsumoto, Honda’s Large Project Leader (LPL) said: “Honda has a very big presence in the US, and in terms of market share in individual states, Honda ranks first in California” (Korzeniewski, 2008). And of course to keep the company’s presence in the US, Honda had to follow CARB regulations. The company produced EV-X as a test vehicle. This new technology of Honda got a promising positive reaction from the test drivers. As the next project and certain of its success, Honda developed EV Plus. It is rather interesting that despite all the positive and hopeful feedbacks to EV-X, in reality, EV plus wasn’t successful.

One reason is as Honda turned away fleet customers for the EV Plus, it played pick and choose as to whom it considered an acceptable retail consumer (Hollander, 2000). Honda produced 340 units of EV Plus and they were only for a limited lease. After two years, Honda pulled them out of the market and crushed them (same as Toyota and RAV4 EV I). The company defended the move claiming that the EV Plus was a car that no one wanted (Hollander, 2000). In fact, Honda was the only company that clearly shown evidence of stopping its EV production in favor of hybrid technology. In 2002, Honda produced FCX EV, which was the world’s first Fuel cell EV. Only 30 units were produced in Japan and US for a limited lease and ground testing. Honda believes that this vehicle was the base technology for the next improved version, FCX Clarity EV 2008. Out of all mentioned EVs manufactured by Honda, none made it successfully through the market. They were all for a limited lease or test purposes. Car companies usually want to provide lease for their new models. There are a number of reasons for this, the most important being reliability. The car companies simply do not know how reliable these cars will be, especially their battery packs (Moore, 1998). Besides, the families leasing the cars are not only early adapters, but they also help the company with a real market test. Figure 2 shows Honda’s eco-friendly vehicles from 1990 to 2012, along with the historical trend of oil price.

![Figure 2](image-url)
Table 2 and figure 4 show Honda’s net income from 1997 to 2012. Same as Toyota, from the early 90s, Honda’s net income increased rapidly and in 2008 set a record of highest net income in Honda’s history. Out of four main Japanese actors in eco-friendly vehicles production, Honda and Toyota pursued HEV production and could benefit the most in 2000s. The next section tries to explain whether Honda Motors chose to become a market or environmental leader in green vehicles’ race. In other words, as far as market penetration for green vehicles is concerned, can we still say that Honda is lagging behind or ahead of other companies?

Table 2., Net income of Honda between 1997 and 2012

<table>
<thead>
<tr>
<th>Year</th>
<th>1997</th>
<th>1998</th>
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<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net income</td>
<td>221</td>
<td>305</td>
<td>262</td>
<td>232</td>
<td>362</td>
<td>426</td>
<td>440</td>
<td>464</td>
</tr>
</tbody>
</table>

Figure 3., US HEV sales by model (source: Alternative Fuels Data Center, 2013)

Figure 4., Financial condition of Honda between 1997 and 2012
HONDA’S LEADERSHIP DILEMMA AND ECO-FRIENDLY VEHICLES COMMERCIALIZATION

At this moment, there are two important questions to ask. Did Honda want to become a Market Leader in green car production? (Tendency to Market Leadership) In addition, did Honda have a vision of Environmental Leadership in the green vehicles market? (Tendency to Environmental Leadership) The answer to both of these questions is yes.

Kazuhiko Tsunoda, chief engineer of Honda R&D, said: “Honda's strategy has been to lead the process of developing new environmental technology” (Tsunoda, 2000). In case of Insight he said: “our goal was to make Insight the world’s most fuel efficient mass production car” (Ibid). Consistent with the above argument, Hamel and Prahalad (1989) stated that Honda’s success was due to its focus on leadership in the technology of internal combustion engines. In both of Japanese and American markets, Toyota and Honda were competing against each other to gain the market leadership. It is correct that Toyota is considered so far the market leader of HEV development, but Fontanelle (2007) notes Toyota and Honda’s competition in Green vehicles benefit both of the companies, especially in US, in terms of tech and popularity.

Another issue worth mentioning is why did Honda lag behind in EV production? Why would Honda neglect the growing market for a radical innovation called electric vehicles, and push hybrid technology instead? The answer, according to Thad Malesh, senior analyst and alternate-fuels specialist at J.D. Power and Associates is: “Nobody wants to give up this huge investment in the combustion engines”. Insight is essentially still powered by a conventional combustion engine. Only 6 percent of its power comes from battery technology (e.g. Hollander, 2000). In addition, Robert Bienenfeld, advanced environmental vehicle marketing manager for American Honda said: “Demand [for EV] was very, very tepid; we never had a waiting list of customers” (Hollander, 2000). Honda argues that selling thousands of the ultra-low-emissions hybrids and gasoline cars will do more for the environment than the leasing of a few hundred zero-emission electric cars. Bienenfeld continued: “Ninety-nine percent of cars are gas, so for the biggest bang, we have to solve that problem”.

Honda’s main concern in the past few decades has always been the superiority of its engines in terms of environmental friendliness, being pollution and noise free, and cleanliness. Kazuhiko Tsunoda, chief engineer of Honda R&D, said: “Honda's strategy has been to lead the process of developing new environmental technology. More recently, our commitment to develop low emission vehicles has focused on developing advanced internal combustion technology.” (Tsunoda, 2000). Before Prius took over the Hybrid vehicle market in the early 2000s, Tsunoda emphasized “our goal was to make Insight Hybrid the world's most fuel efficient mass production car” (e.g. Tsunoda, 2000). Years later, Motoatsu Shiraishi, Honda’s director in charge of environment, repeated the same and said: “Honda will pursue higher efficiency in internal combustion engines, which are today’s mainstream engine technology and as such represent the greatest near-term opportunity for reducing our environmental impact on a global scale” (Honda annual environmental report, 2006). As a result, Pohl and Yarime (2012) concluded that Honda's main motive behind the introduction of HEVs was to maintain a leadership in fuel efficiency.

This strategy of Honda is not only limited to Hybrid technology, but it also caused a huge transition in the fuel economy of Honda’s ICEs. Figure 5 shows the transition in Honda’s fuel economy from the mid-90s to the mid-2000s. In 1983, Ikuo Kaijatani who was an engineer of Honda at the time developed an engine technology in house called “VTEC engine (dream engine)”. The E (economy) version of the engine was introduced in 1992 and soon became the foundation for many of Honda’s breakthroughs in environmental technology (Anderson and Zaelke, 2003). Later from 2001, Honda evolved VTEC-e into i-VTEC, k-VTEC, and R-VTEC. This evolutionary technology of Honda has been used in different types of vehicles such as Civic HX Coupe, Civic VX, Accord, and CR-V; and it also has been used for engine swap operations, especially in the US. VTEC series have the highest fuel economy in their class, with the air/fuel ratio of 65:1, while normally, gasoline engines have the air/fuel ratio of 14.7:1.

Figure 5., Transition in fuel economy of Honda gasoline vehicles – categorized by weight (source: Honda environmental annual report 2001, 2006)
Based on Honda’s environmental annual report (2001), this system made it possible to achieve both a high fuel economy and a high level of exhaust gas cleanliness at an “Excellent” level. Considering the financial condition of Honda between 2001 and 2008 (Figure 27), it has been argued that Honda’s success was due to its concentration on environmental leadership in the technology of gasoline engines (e.g. Hamel and Prahalad, 1989). Honda wanted to repeat its “being leader” strategy of engine technology, with focusing more on fuel efficiency rather than innovation and design, something that may cause Honda to fail in being a HEV market leader. In short terms, Honda’s gasoline vehicle fuel economy guaranteed the sales trend for Honda during the 2000s.

Honda’s system of improvement is also a fact that shouldn’t be ignored. Honda’s innovation orientation was mostly around evolutionary innovation. In this sense, Honda mostly focused on improving the existing technology. Revolutionary technology is entirely new and represents a breakthrough in environmental performance. Evolutionary technology fine-tunes existing technology to further increase power and fuel efficiency and to reduce emissions (Anderson and Zaelke, 2003).

Tomohiko Kawanabe, who served as Honda’s managing director, confirmed this and said: “Revolutionary breakthroughs like the CVCC were continuously improved until we reached the limits of emission reduction. When we couldn’t go any further, we jumped to a new revolutionary technology and then continuously improved that” (Ibid). VTEC to i-VTEC improvement and the development of the exhaust filter (Perovskite 3-way Catalytic Converter System for Automobiles) are examples of Honda’s evolutionary innovation system. In this regard, Toyota introduced its first Prius in the late 90s as a revolutionary vehicle, while Honda Insight was introduced as an evolutionary improvement. The hybrid Insight two door coupe looked like something out of a science fiction movie, was small and impractical, demanding that its buyers sacrifice space, comfort, and appearance in exchange for high gas mileage which customers were unwilling to do. Roy (2009) states its size and Spartan interior limited the car’s general appeal and it required too many compromises. For marketing Insight I, Honda used a small budget for Internet and TV ads in local media, while Toyota used video clips sent to over 44,000 people, as well as a test drive option through 900 dealers. Toyota also dedicated a special website to Prius two years before the introduction of the product. Figure 6 shows Prius I and Insight I model comparison and early sales in US.

Figure 6. Prius I (left) and Insight I (right), model and early sales comparison – units (compiled from: DOE, 2008; photos from Mixed Power, The auto channel)

In the late 2000s, Honda changed Insight completely: A 4-door sedan with maximum safety, high fuel mileage, driven by aerodynamics. Roy (2009) wrote Honda insight II features were never even considered for the original Insight.

V. DISCUSSION

Currently, there are more than a hundred eco-friendly vehicles produced as a test, concept, or for mass production. A majority of this share goes to small start-ups, which their outcome is only for the test or prototype purpose. From Japanese companies, Toyota and Honda are considered as the pioneers of Hybrid technology, as they started their technological investments from mid-90s, and they commercialized their first practical HEVs in late 90s. Toyota developed its first in-house Hybrid technology called “Toyota Hybrid System (THS)” in 1995, while Honda developed its first hybrid technology, “Integrated Motor Assist (IMA)” in 1996.

Comparing different car companies and their decisions, it is clear their eco-friendly development projects are not similar in nature. In other words, each company has a different set of disputes for its approach toward the eco-friendly vehicles commercialization. For example, Dehkordi et al. (2013) have demonstrated that for several years, Nissan’s engine breakthrough made its vehicles the forefront of CO2 emission and environmental friendship, and as a result, the company didn’t consider EVs and HEVs as a beneficial and strategic asset. Meanwhile, Honda as a fast follower of Toyota considered HEVs as a major breakthrough and a chance to increase its competitiveness in the market and started to strongly invest on them from 1996.

One important discussion on the social acceptance of the products is that at the outset, there were HEV and EV technologies available to the market. By using the HEV technology, people found it more comfortable, with a better design and model; they didn’t need to change their behavior in order to use the product, and a variety of other reasons.
By acquiring an EV, the customer needed to change his/her behavior, learn how to charge and deal with new technology, less comfort and lack of infrastructure. As a result, people bought more HEV rather than EVs. Furthermore, HEV development processes showed an increasing return to the scale and it could be called a Path dependent process. From the mid-2000s, due to the advancement of technology, R&D investments, and better infrastructure, switching cost of the technology declined and people also already had some experience with eco-friendly vehicles.

Indeed, different factors were associated with the Honda’s historical HEV development, but as was mentioned, a few were more influential than the others. For example, Honda’s superiority in the current engine technology that is the result of long term engagement with engine development, and Honda’s system of innovation that has been in operation since the company was founded, have been some of the significant factors.

The future of HEVs and EVs development is not clear enough. Based on the historical evidences, while ICEs and EVs are in a totally opposite position of fleet spectrum, HEVs acted as a bridge technology of the transition from fossil fuel vehicles to zero emission ones. They have helped prepare society’s mindset, trigger the infrastructure importance, and cut down the vehicles CO2 emission. The question of “Whether in the future, EVs will dominate or all of these alternatives will co-exist” is a new academic interest.

REFERENCES


ABOUT AUTHOR

Dr. Majid A. Dehkordi is Senior Director at Starlight Group, Tokyo. He is currently specializes in HR and Managerial consulting and practices in APAC market. He is graduated from Hitotsubashi University with a PhD degree in Marketing and Management. His areas of research interests include Media and Communication studies, Entrepreneurship and Innovation, Marketing, and Green technologies.

Dr. Seiichiro Yonekura is a professor of Economics at the Hitotsubashi University. He holds a Ph.D. in History from Harvard Graduate School of Arts and Sciences, US. He served as the director of Institute of Innovation Research in the Hitotsubashi University. He is also Dean of Nippon Genki Juku for lifetime education at Academyhills in Roppongi, Tokyo since 2009. His areas of research interests are on the history of game software industry, future potential of eco-friendly industries, and Social innovation.