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# Hybrid Vehicle Adoption – A Conceptual Study

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**Abstract:** Market share of hybrid vehicle is still low as compared to non-hybrid vehicle. From business point of view, slow growth in hybrid vehicle sales may causes losses on hybrid automobile manufacturers and they may end up withdraw from the market. In order to increase the sales of hybrid vehicle, a solution must be generated. To find a good solution, automobile producers must understand the market condition as well as the reasons/factors that influenced adoption of hybrid vehicle. This research aims to contribute to the understanding on the consumer behavior that causes the adoption of hybrid vehicle and hope to contribute to the reduction in global warming as well as theoretical development.

**Keywords:** *Hybrid vehicle, green marketing, global warming, automobile*

## 1. Introduction

Hybrid automobile is a revolution technological changes that going to reshape the automobile industry. Vehicles were available in steamer and gasoline and now electric/hybrid vehicle appeared and may change the preference of consumer. The electric/hybrid vehicle may become the preferred choice due to the increase in oil price and global warming. In 1969, a lightweight experimental hybrid car can run with electric power up to 10 miles per hour been produced. The General Motor began delivery electric cars to U.S. Postal Service for testing and a government program to advance electric and hybrid technology began. In 1976, General Electric works with motor industry to improve batteries, motors, controllers and other hybrid electric component. General Electric chose to construct a parallel-hybrid sedan, and Toyota built its first hybrid small sport car, with gas-turbine generator supplying to electric motor. After 10 years, automotive hybrid technology becomes widespread. Toyota Motor developed and market vehicle with lowest emission on $CO^2$. They came out with Toyota Prius in 1997, and improve fuel efficiency by 50% by the following years in Japan. While in Europe, Audi became the first manufacturer of hybrid vehicle in large quantity. However, it was not a commercial success and it has been discontinued. The other automakers introduce their small selection of electric cars in California, including Honda's electric vehicle Plus, GM's Electric Vehicle 1, and S-10 electric pickup, and Toyota's RAV4 electric vehicle. However, the electrics failed to reach hundred drivers during earlier adoption. Then the electric programs were dropped. All that development happened in between 1997 and 1999.In 2002, Honda Civic Hybrid launched, which is hybrid gasoline-electric car. The appearance and drivability was and still identical as conventional Civic (history of hybrid vehicles, 2013).

Hybrid vehicle sale has shown a tremendous increased of 84% in year 2012 as compared to 2011 in Malaysia. The total sales of hybrid car stood at 15,355 units in year 2012 compared to 8,334 units in 2011 (MAA seeks longer fit period for hybrid cars, 2013).Though the surge of sales is encouraging but the total demand as compared to the total passenger car sales of 552,189 units (MAA, 2013) is still lackluster. Environmental friendliness and green marketing has become an ever-important issue in today's society. One of the effects is the transformation of demand on petrol-based automobile into electric and/or hybrid automobile. This effort aimed to decrease greenhouse effect and protect the environment by reducing $CO^2$ emission. Besides, price of petroleum is getting higher in the market as the resource is being depleted. Thus, driven by the market demand, automobile manufacturers are putting more effort in producing hybrid automobiles. However, the market share of hybrid automobile is still low when compared to non-hybrid automobile and the slow growth in sales may discourage automobile industry from advancing in this market. Therefore, it is of paramount important that study on the consumption choice of hybrid cars being conducted to identifying the factors that affect consumer's intention to purchase hybrid car. The manufacturers would then produce hybrid vehicles that wanted by the consumer and increase share of the market. Here are the several questions that we would

like to reveal from this study. First, we want to investigate whether consumer who intent to purchase hybrid car would pay extra amount of money (in comparison to conventional vehicles), and how does the extra 'benefits' that comes from owning a hybrid pay off? Besides, is the awareness of consumers about hybrid car influences their purchase intention? From the perspective of technology, is the technology advancement influences customers' purchase intention? Lastly, is the demographic of consumers affects their purchase intention?

## 2. Literature Review

A few variables found to influence customer perception and intention to purchase hybrid vehicle in this study. Those variables are financial condition, consumer awareness, quality of vehicle and demographic background of consumer.

**Financial Conditions:** Financial condition is the status of the assets, liabilities, and equity of an individual. Initial cost is the cost differentiation between two vehicles, which one might cost more than the other, cost consideration, is very important for consumer when making purchase because it affects the livelihood of consumer. Several factors such as potential cost, high initial cost and cost on additional electric components on hybrid car found to affect the buyer from purchasing a hybrid car. Though most buyers understand that that hybrid car reduced CHG emission and is consider as fuel-efficient vehicle, they are still reluctant to purchase since hybrid car cost more than conventional cars of the same class (Mariam and Narayan, 2009). Maintenance cost is the fees that pay to keep physical assets in working condition to ensure their availability and to reduce the chance of failure. An effective maintenance program can enhance safety, increase reliability, and reduce errors, lower operating costs, and increase the life span of assets. Lifetime maintenance and repair cost is one of the main causes that increase the buyer reluctant to purchase a hybrid car. The maintenance and repair cost is more expensive due to the problem of low number of technicians and maintenance equipments in the market. Besides that, a break-even analysis shows that battery lifetime and the replacement cost is more expensive than non-hybrid vehicle until today (Lipman & Mark, 2006).

Payback period measure the length of time needed for an investment's net cash receipts to cover completely the initial outlay expended in acquiring the investment. The past study on payback period of hybrid vehicle finds that hybrid vehicle save money for consumers in the long run and this has induce their interest in purchasing hybrid vehicles. On the other hand, the long payback period of hybrid vehicle through fuel saving may reduce consumer interest in purchasing a hybrid vehicle because they the fuel saving cost might be less than what they are expected (Dooman, Ennis & McCann, 2010). Resale price is the sale or transfer of a vehicle from an owner to second purchase. Gillingham (2011) finds that the main factor that a buyer may consider when making a decision to purchase a car is the future resale price of a newly purchased vehicle. The vehicle attribute such as fuel economy, purchase price and resale price are the variable that determines the intention of consumer to purchase a hybrid car. The fuel saving benefit was calculated for those years that the initial purchaser owned the vehicle before resell it. Capital cost, fuel cost, horsepower, subsidy and consistency of hybrid vehicle found influenced consumer's intention to purchase a hybrid vehicle (Axsen, Mountain and Jaccard, 2009). Finally, it is concluded that financial conditions would influenced the purchase intention of consumers on a hybrid vehicle. Though hybrid vehicle can save more fuel but other costs need to be taken into account when purchasing a vehicle.

**Quality of Hybrid Vehicle:** A research been done to explore the influence of vehicle attributes that consist of monetary, non-monetary (size, fuel availability), environmental pollution levels and household characteristic on preferences for clean vehicle technologies. The result shows that cost and performance characteristics, reduced tax and pollution remain as the main factors of choosing to buy hybrid vehicle in Hamilton, Canada (Potoglou & Kanaroglou, 2007). Jansson, Marell and Nordlund (2010) researched on determinant that influenced consumer eco-innovation adoption and early adopters. They studied the different types of behavior to develop and understand the related attitudes and post-purchase behaviors in this research. Result shows that willingness on eco-innovation adoption is positively influenced by personal norms but negatively influenced by habit. Paulus (2002) finds that the main concern on adoption of hybrid vehicle by consumer is still fall on cost consideration. However, the cost-reducing trend of hybrid vehicle has

resulted higher adoption rate. As the cost reduced, the other attributes of vehicle such as quality became more important in influencing consumer purchase decision.

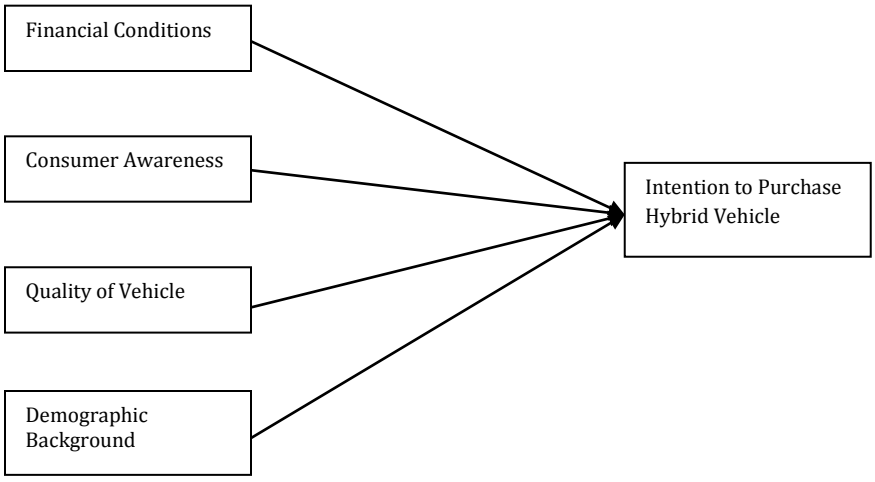
**Consumer Awareness towards Hybrid Vehicle:** Maritz Automotive Research (2011) finds that low consumers familiarity and understanding about alternative fuel for vehicle affect their purchase intention, as they think it is just good to be second choice for their next purchase, not the first. Research on consumers' response to reduce emission of $CO^2$by providing information to them about existing environment problems and options finds that consumers would change their lifestyle to less harmful to the environment. Consumers who have the knowledge about the existence of a problem, knowledge of better options, a feeling of responsibility, and the belief that their own actions can improve the situation tempted to reduce those harmful behavior(Coad, de Haan, and Woersdorfer, 2009).

**Demographic Background of Consumers:** Oliver and Lee, (2010) compared the United State and Korean consumers' in purchasing high-involvement, environmentally friendly product. From the result, the relationship between hybrid vehicle purchase intention and social value is positive for the consumers of both countries. This suggests that the social value associated with the direct ownership of a hybrid vehicle has positive influence in both individualist and collectivist cultures. A research been done on examining the determinants of green curtailment behavior and consumer adoption of innovations marketed as green (eco-innovations), and to analyze factors explaining these two types of green behavior. In the curtailment case, the effect was negative indicating that previous adoption decreases the willingness to curtail car use. This research implies that adopters of eco-innovations, in this case the alternative fuel vehicle, are content with their initial adoption decision and exhibit a strong willingness for conforming that decision in future purchases (Jansson et. al, 2010). Social interaction found to affect the intention of people to purchase hybrid cars. Some people are following the trend or the direction of the group when they want to make decision (Axsen et. al, 2009).

## 3. Theoretical Framework

From the literature, it is found that the four factors that may influence the consumption choice of hybrid/electric vehicle are financial condition, consumer awareness, and quality of vehicle and demographic background of consumers. These relationships are as shown in the figure1:

**Figure 1: Purchase Intention Model of Hybrid Vehicle**




## 4. Conclusion

There are a lot of benefits that could be realized by adopting green behavior such as adoption of hybrid vehicle. By adoption of green behavior, consumers would gain the benefit of cost saving and more importantly would contribute to the reduction of global warming and depletion of ozone layer. This behavior

would contribute to the survival of humankind in this planet and therefore it is a very important research to be conducted. This study contributes to the understanding of the issue and leads a direction to such research.

**References**


Axsen, J., Mountain, D. C. & Jaccard, M. (2009). Combining Stated and revealed choice research to simulate the neighbor effect: The case of hybrid-electric vehicles. *Resource and Energy Economics*, 31, 221-238.

Coad, A., de Haan, P. & Woersdorfer, J. S. (2009). Consumer support for environmental policies: An application to purchases of green cars. Ecological Economics 68, 2078 – 2086. Retrieved from http://linkinghub.elsevier.com/retrieve/pii/S092180090900038X

Dooman M., Ennis P. & McCann J. P. (2010). An Interactive Qualifying Project Report Submitted to the Faculty of the Worcester Polytechnic Institute in Partial Fulfillment of the Requirement. Project Number: HGV-0210.

Gillingham, K. T. (2011). The Consumer Response to Gasoline Price Changes: Empirical Evidence and Policy Implications, a PhD Dissertation, Stanford University.

History of Hybrid Vehicles. (2013). Retrieved from http://www.hybridcars.com/history-of-hybrid-vehicles

Jansson, J., Marell, A. & Nordlund A. (2010). Green consumer behavior: determinants of curtailment and eco-innovation adoption. *Journal of Consumer Marketing*, 27(4), 358 – 370

Lipman, T. E. & Mark, A. D. (2006).A Retail and Lifecycle Cost Analysis of Hybrid Electric Vehicles. *Transportation Research Part D*, 11(2), 115-132.

MAA. (2013). Retrieved from http://www.maa.org.my/

MAA seeks longer fit period for hybrid cars. (2013). Retrieved from http://www.btimes.com.my/articles/20130329175845/Article/

Mariam, K. & Narayan C. K. (2009).Hybrid Electric Vehicles for Sustainable Transportation: A Canadian Perspective. *World Electric Vehicle Journal*, 3(1).

Maritz Automotive Research Group. (2011). Study Shows Growing Consumer Awareness About Alternative Fuel Vehicles. Retrieved from http://www.maritz.com/en/Press-Releases/2011/Maritz-Automotive-Research-Group-Study-Finds-Growing-Consumer-Awareness-Concerning-Alternative-Fuels.aspx

Oliver, J. D. & Lee, S. H. (2010). Hybrid car purchase intentions: a cross-cultural analysis. *Journal of Consumer Marketing*, 27(2), 96 – 103

Paulus, C. W. M. (2002). Modeling Consumer Preferences and Technological Change: Survey of Attitudes to Hybrid Vehicles. Bachelor of Science Dissertation, Simon Fraser University.

Potoglou, D. & Kanaroglou, P. S. (2007) Household demand and willingness to pay for clean vehicles. *Transportation Research Part D: Transport and Environment*, 12(4), 264-274.