THE EFFECTIVENESS OF GREEN MARKETING STRATEGIES IN THE AUTOMOTIVE INDUSTRY: A CONSUMER-BASED ANALYSIS

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Keywords: green marketing strategies, consumer perspective, automotive industry.

Abstract

Global companies that are publicly committed to Corporate Social Responsibility (CSR) have agreed to pursue a standard of responsible business that requires consistent integration in core business practice and in all countries of operation. Such businesses need to find ways of adequately supporting development and delivery of improvement plans on local levels.
Introduction

In recent times, “Green” has become a pervasive buzzword in business. Companies brand their products with environmentally friendly features and labels, as they are trying to convey to the market the image of a sustainable company. These efforts are generally referred to as “Green Marketing” (GM) strategies. This study focuses on the GM tendencies in the automotive industry. The automotive industry is pushing forward the competition through the ecological and sustainable path, betting on hybrid technologies and electrification. Transport accounts for roughly a third of greenhouse gases (GHG) emissions worldwide and public opinion widely considers it one of the most evident symbols of pollution. For this reason, car manufacturers are largely investing in the development of more efficient and eco-friendly products, as well as in the communication of such features to the market: by 2020, it is predicted that electric vehicles will account for the 20% of the auto market (Milmo, 2009). The decarbonisation of the industry is a top priority also in governments’ and regional authorities’ agendas. The EU has established the European Clean Transport Facility (ECTF), a development fund for low or zero carbon projects. In the UK, the government announced plans to improve electric charging infrastructures and subsidy motorists to buy electric or hybrid cars. The US Advanced Technology Vehicle Manufacturing (ATVM) program has made available funds for the development of clean technologies, such as EV batteries and electric motors. In Japan, the government has been encouraging the electric automotive through tax incentives and R&D grants since the 1990s. Last but not least, Chinese government is aiming to become the world’s leading manufacturer of electric vehicles and batteries and is supporting the industry through consumer subsidies and extensive R&D grants (Milmo, 2009). This eco-trend offers a wide range of innovative occasions for businesses. Consumers generally consider environmentally friendly innovation as an important driver of differentiation (Kassarjian, 1971). Car makers are aware of this tendency, and they aim to exploit this trend fruitfully. Still, do car manufacturers GM strategies correctly address the consumers?

The main aim of this explorative study is to answer this question, i.e. to evaluate the effectiveness of car manufacturers’ GM in promoting and building consumers’ awareness on sustainability issues.
The first part of this work consist of a brief examination regarding GM in literature, observing the considerations of main scholars (Fisk, 1973; Polonsky, 1994; Peattie, 2001; Grant, 2007). The costs and the benefits of a corporate strategy based on sustainable values are analysed. Then, relevant studies regarding how GM can affect consumers’ behaviour are presented. Finally, propositions are developed.

Through the use of a questionnaire and factor analysis, the four macro-components driving consumers’ purchasing habits have been determined. Those are performance, functionality, eco-friendly and brand appeal. Then, each component has been evaluated for car manufacturers’ brands. Results suggest the presence of a strong brand bias when consumers are called to assess the eco-friendly factor.

In the end, the outcomes are discussed, showing crucial implications for both academia and practitioners.

**Theoretical Background**

*Green and Sustainable Marketing*

The American Marketing Association (AMA) defines marketing as “the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large”\(^2\). The notion of GM stems out from a broader idea of “value for customers” that includes socially responsible and environmentally friendly elements. This re-interpretation of the customer value proposition relies on the strategic orientation of the firm toward corporate sustainability (CS).

Although there are various propositions of CS (Gobbels, 2002; Panapanaan, Linnanen, Karvonen, & Phan, 2003), a broad definition can be inferred from literature: “in general corporate sustainability and CSR refer to company activities – voluntary by definition – demonstrating the inclusion of social and environmental concerns in business operations and in interactions with stakeholders” (Van Marrewijk, p.102, 2003). CS re-writes the relationship of trust between the company and all its interlocutors so

\(^2\) American Marketing Association – approved definition, October 2007
that the company takes the responsibility of the requests coming from these in order to offer a service that goes far beyond the execution of a pure material need (Castaldo...). In this way, social issues lose the “generic approach” or the “value chain one-dimensional approach”, and gain a significant impact in both economic and social results thanks to the “social dimension of competitive context” approach based on a two-variable strategy in order to maximize the two outcomes (Porter & Kramer, 2006).

The roots of the idea of an environmentally oriented marketing date back in the history of this field. Fisk (1973) sets out some fundamental considerations concerning a new equilibrium between production and consumption in an environmental key. The author denounces the lack of balance between production and consumption as a result of an irrational exploitation of the resources. Fisk notes how the lack of new and effective rules will cause the system to collapse, especially considering the growth in the population. Fisk’s “warning” became a kind of admonition for the petrol crisis which occurred in the end of 1973, when the OPEC countries interrupted petrol supplies to the importing countries. Following the crisis, the American Marketing Association held the first workshop on “Ecological Marketing” in 1975. The meeting marked the official recognition of environmental themes by the principal operators and marketing experts.

In 1976, Henion and Kinnear focus on the real effects of marketing activity on the environment. Indeed, they use the term “ecological marketing” as “the study of the positive and negative aspects of marketing activities on pollution, energy depletion and non-energy resources depletion”. The two scholars point out that there is a physical limit which the productive system cannot surpass, identifying the model of a consumer who accepts a responsible code of behavior because he has realized that the level of polluting refuses produced by the final users is not inferior to the refuse produced by industry. However, both Fisk’s and Henion & Kinnear’s contribution attempt to find solutions in a critical phase where there was a common need for immediate answers. The authors’ attention concentrates on highly operative aspects which tended to reduce the emerging damage and the shortage of resources in the production and sales cycles.

Polonsky (1994) tries to draw a broader picture with reference to marketing in general (Stanton and Futrell, 1987). He links the effects of marketing activities to the impact that these activities might have on the en-
vironment. The author claims that “Green Marketing” or “Environmental Marketing” consist in “all activities designed to generate and facilitate any exchanges intended to satisfy human needs or wants, such that the satisfactions of these needs and wants occurs, with minimal detrimental impact on the natural environment”. Another definition of GM is provided by Peattie (1992): “The holistic management process responsible for identifying, anticipating and satisfying the needs of customers and society, in a profitable and sustainable way”. Polonsky points out how the new “green” formulations concerning production and products are opportunities to be exploited in order to obtain a competitive advantage, since the public is more interested in environmental problems and, therefore, more attentive to the use of goods and services created in this direction. He also considers the intervention of public rules as a necessary element to ensure that GM has proper features and aims: “1. to clearly quote the benefits for the environment, 2. to explain environmental characteristics, 3. to explain the benefits obtained, 4. to ensure that the differences compared are well-founded, 5. to ensure that negative factors are taken into consideration, and 6. to use only words and figures that have a sense.”

GM started to be considered a growth opportunity. Bradley introduces the “Green Marketing Mix”, adding packaging, distribution, advertising, sales force and the after sales service to the traditional four “Ps” (product, price, place, and promotion). Pierre and Prothero (1997), Ottman (1998, 2006) and Prakash (2002) underline how the introduction of green products is a new advantage from the differentiation point of view, just as Miller (2008), who refuses the idea of sustainability as a financial burden. Prakash (2002) also illustrates how GM not only needs new managerial approaches, but also public intervention policies through incentives and instruments dedicated to these. Van Dame and Apeldoorn (1996) develop the notion of “sustainable marketing, which is marketing within, and supportive of, sustainable economic development”, and distinguish it from ecological and green marketing. They indicate that ecological marketing, although highlighting the physical limits of production (because of the scarcity of the resources), does not clearly express the rules to be adopted to guide the dynamics of consumption along the path of sustainability. Even green marketing is incomplete because it takes as opportunities

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2 Polonsky gives some examples: a 1992 research carried out in 16 countries where more than 50% of the consumers state an interest in the environment (Ottman, 1995) and a 1994 research carried out in Australia where 84.6% of the sample thought that every individual is responsibility for the care of the environment.
what was originally felt to be a moral duty, thus it is relegated to a “num-
ber of companies which supply a limited number of green products to a
limited number of consumers”. In conclusion, the scholars point out how
sustainable marketing is a “macro-marketing concept” since it “includes
every producer and every consumer” against their will and “requires a
change in everybody’s virtual behaviour”.

Fuller (1999) describes sustainable marketing through an analysis based
once again on the concept of product and satisfaction. “The process of
planning, implementing and controlling the development, pricing, pro-
motion and distribution of products in a manner that satisfies the follow-
ing three criteria: (1) customer needs are met (2) organizational goals are
attained, and (3) the process is compatible with ecosystems”.

Peattie (2001) indicates three phases or ages which turn in the challenges
of sustainable growth. The first age, in the ‘70s, is defined “Ecological”
Green Marketing. The attention is on the effects coming from produc-
tion, that is to say pollution and depletion of the natural resources. Pro-
posed solutions are technical in their nature and call for a more restrictive
legislation. Environmentally friendly strategies are perceived as restric-
tions or duties, rather than opportunities. The second stage developed at
the end of the 1980s; Peattie describes it as that of “Environmental Green
Marketing”. In this period, the awareness of a new and re-considered rela-
tionship between economic activities and the atmosphere increased due
to major environmental disasters (in Europe, the accident at the Cher-
nobyl nuclear power station in 1986). In this climate, there was a more
interested public opinion. The concepts of sustainability (as expressed
previously in the Brundtland Report), of “clean technologies”, of “green”
consumers, and of competitive advantages are linked to eco-compatible
production, to environmental performances and to environmental qual-
ity (e.g. the TQM process, Total Quality Management). The final stage is
called the age of the “Sustainable Green Marketing”. In this last phase,
Peattie indicates three challenges that marketing has to face: 1. to guar-
antee satisfaction for consumers and profits for investors, now and in the
future (futurity), 2. to provide for an equal distribution of costs and ben-
efits of economic growth between the various countries (equity), and 3.
to concentrate more on the essential needs of the developing countries
rather than on those of the industrialized countries (needs/wants).
Green Marketing and Consumer Behavior

A large part of literature has explored whether and how environmentally oriented marketing affects consumer behavior, originating a vast and multilayered area of research.

The first point to be considered is the effect on consumers’ willingness to pay. As reducing environmental impacts of production requires extra investments, companies expect the market to pay a premium price for allegedly environmentally friendly products. Literature provides a strong evidence on the existence of an increased willingness to pay when consumers face goods that declare to be “green”. In 1970, Kassarjian examined the case of the F-310 gasoline, a fuel claiming to reduce polluting emissions through the presence of an additive. His results showed a significant willingness to pay premium prices, and he concluded “With a good product based on ecological concerns, the potential for a marketer seems to be impressive” (Kassarjian, 1971, p. 65). Considering food industry, Teisl, Roe, & Hicks (2002) found that consumers are willing to pay more for canned tuna after the introduction of “dolphin-safe” labels, while Galarraga & Markandya (2004) observed a significant premium for organic and “fair trade” coffee in the UK. Another example is provided by Maguire, Owens, & Simon (2004), who calculated the hedonic price of organic babyfood, finding a premium from 16% to 27% as opposed to conventional babyfood. Nimon & Beeghin (1999) and Casadeus-Masanell, Crooke, Reinhardt, & Vasishth (2009) showed consistent results in the textile industry. The consumers are willing to pay substantial price premiums (over 30%) when the manufacturers switch from conventional to organic cotton.

Nevertheless, some uncertainties still persist, calling for a deeper analysis of the GM-consumer behavior relationship. Some authors observed a gap between consumers’ declared intention to purchase environmentally friendly goods and their actual consumption behavior. This so-called attitude-behavior gap (Peattie & Crane, 2005) has gathered considerable scholarly attention, which tries to understand in which conditions it occurs. Initially, skepticism of the “green” committed consumers was indicated as a key bias in determining their purchasing habits. Zinkhan and Carlson (1995, p.5) introduced the idea of a “green consumer, who is somewhat cynical about marketing activities and is likely to discount
advertising messages”. Their proposal was supported by Shrum, McCarty and Lowrey (1995), who observed a correlation between green consumerism and advertising skepticism. These findings found wide recognition in GM literature, and still today are shared by a number of scholars (Bickart and Ruth 2012; Finisterra do Paço and Reis 2012; Fowler and Close 2012; Royne et al. 2012; Sheehan and Atkinson 2012). Despite the spreading of the skepticism argument, Matthes and Wonneberger (2014, p.115) pointed out that “many scholars have accepted the idea of the skeptical green consumer without systematically examining the factors that drive skepticism toward green ads”. They claimed that general advertisement skepticism has to be distinguished from green ads distrust, as well as green consumers’ reaction has to be disentangled from nongreen consumers’ one. According to their research, green oriented consumers find informational utility in green ads, showing more trust when compared to nongreen consumers. Their assessment process of the green ad is based on rational elaboration, rather than on the emotional appeal of the message. Therefore, “if the arguments provided by the ads are strong, trustworthy, and high in informational utility, a positive evaluation of argument quality will follow” (Matthes & Wonneberger, 2014, p. 125), conversely “advertising claims that are difficult for consumers to verify are likely to prompt skepticism, consumer distrust, or disbelief of marketer actions” (Bickart & Ruth, 2012, p. 52). It is the case of the so-called “green washing” strategies, used to clean up a company reputation with illusory advertising or reparative campaigns, or cover up environmental or social misbehaviours. Thus, the reasons explaining the attitude-behavior gap do not lie in a general skepticism of the green consumers, but are linked to other factors.

In their studies regarding environmentally friendly consumption, Green and Peloza (2014) included two different forms of advertising appeals and the moderating effect of the setting (public versus private). Indeed, Advertising appeals can foster private benefits or societal benefits, according to the tone of message and the information provided. To put it differently, ads can stress benefits for the society and the environment in general, focusing on, for example, emission reduction or generation of collective good, or they can emphasize the benefits the product provides to the consumer in terms of money saving, reduced energy consumption etc. Scholars debate on which form of advertising appeal prevail when consumers are called to purchase green products. Webb, Mohr and Harris (2008) consider green consumption to be motivated by societal benefits
appeal because consumers pay more or give up part of their private benefit when they purchase environmentally friendly goods. On the other hand, Rotschild (1979), Allen (1982) and Peattie (2001) argue that private motivations, like money saving, are the only way to encourage prosocial behaviors and they often succeed even when the environmental benefits are marginal. Green and Peloza (2014, p.134) propose that “consumers’ responses to advertising appeals that encourage environmentally friendly consumption behavior are […] significantly influenced by the decision-making context” in order to overcome the dichotomy in literature. In particular, they introduce in their model the moderating role of impression management, according to which individuals desire to have a positive impression on others and tend to present themselves in a favorable way. Their results show that consumers’ purchasing habits are driven by societal benefits appeals when they are publicly accountable for their behavior. Griskevicius, Van den Bergh and Tybur (2010) support this outcome, showing that preference for hybrid vehicles increases because they are publicly visible products. They address to competitive altruism (Miller, 2000; Zahavi, 1975) and costly signaling theory (Roberts, 1998; Van Vugt, Roberts, & Hardy, 2007) to explain this phenomenon. According to their view, altruism is a symbolic behavior that proves a prosocial status. Such status is highly desirable, as it is linked to reputation, trustworthiness, prestige and it can eventually affect the role of an individual in a group. For this reason, consumers compete to signal, even in a costly way, their prosociality and their capacity to spend resources, time and money for the collective sake without negatively affecting their lifestyle. This explains why, according to a market research published in 2007 by The New York Times, 57% of Prius owners bought the car because “it makes a statement about me”, while just 36% cited energy saving as a key motivation. “By purchasing a Toyota Prius […] a person can signal that he or she is a prosocial, rather than a proself, individual. That is, instead of buying a conventional and more luxurious car that benefit only him or her, the Prius owner instead voluntarily chooses to benefit the environment for everyone- even though this act means forgoing the luxury of having a car with more features, comfort or performance” (Griskevicius, Van den Bergh, & Tybur, 2010, p. 393).
A Propositions development

As stated before, the automotive industry competitive arena is following the ecological and sustainable path, developing hybrid technologies and electrification. The investments in greener products are growing rapidly in this highly competitive sector. To quote some examples, Ford Motor Company’s business plan includes a short-time electrification of the present fleet, including a full electric van-type vehicle for commercial uses, new hybrids, plug-in hybrids and battery electric models by 2012. Ford planned investments on fuel-efficiency for $14 billion ($5 billion loan from the US Department of Energy and $9 billion in bridge loans), with the aim to achieve a 36% enhancement in fuel economy for its whole range by 2015. Thanks to a bridge loan of $7 billion, Chrysler is investing in efficiency increase and emissions reduction with flex-fuel technologies and smaller fuel-efficient vehicles, such as its first electric-drive pickup and three further electric-drive cars planned by the end 2013. Audi challenges the energy production industry becoming itself a producer of alternative fuels in order to propose a valid ecological alternative to the oil market. The project is called “Audi Balanced Mobility” and the aim is to cut emissions starting from the car’s production cycle through the development of “e-gas”, synthetic methane obtained converting potential polluting CO2 generated in industrial processes. The hydrogen needed is extracted in the North Sea with an investment of €50 million and private funds. Audi’s new models will be assembled with flexible-fuel turbo methane engine exploiting the “e-gas”. In the last two years, Audi has invested roughly €65 million for a new centre for electrified power trains in its headquarter in Ingolstadt.

Consequently, once understood the reasons and the dynamics of the relationship between GM and consumers’ purchasing, it is important to be aware of the customers’ opinion and feel the reactions to this trend. The main objective is to provide an estimation of the real distance between the green car and the customer, since “to be green” has become a common factor for the entire industry. The first proposition of this study regards the effectiveness of car manufacturers GM strategies on consumers purchasing behaviours.

Proposition 1: Car manufacturers GM strategies successfully create
“green” awareness in consumers, as they consider environmental performance in their purchasing decision process

Bickart & Ruth (2012) observed through two studies that brand familiarity plays a central role in guiding the consumers’ perception of a green advertisement. In particular, they showed that “when consumer [environmental] concern is high, an on-package eco-seal shown in an ad helps familiar brands but hurts unfamiliar brands. […] low environmental concerned consumers evaluate the familiar brand more favorably than the unfamiliar brand” (Bickart & Ruth, 2012, p. 62). Evidently, brand image has the power to affect consumers’ trust (or skepticism) in advertising claiming the green performance of the product. Therefore, it is important to consider brand positioning effect in the mind of the customer, especially considering the car market, where brand image notably conveys the quality and the features of the car. For example, a brand commonly associated with the idea of safety might be as well considered as environmentally friendly. The second proposition deals with the relationship between perceived environmental performance and brand positioning.

Proposition 2: Car manufacturers’ brand positioning affects consumers’ perceptions concerning the environmental performance of their products.

Methodology

This explorative study supports the proposition analyzing data collected through a survey. The questionnaire consists of three sections: consumer general and specific purchasing habits, brand positioning and personal information. The questionnaire has been submitted through the internet, and in particular via social networking services (Facebook and Twitter mainly). Accordingly, social media users, excluding a priori under-18 users, constitute the sample. Indeed, it was possible to collect 300 completed surveys. The first part of the questionnaire is the self-identifying block, inquiring about the following personal features: gender, age, occupation, provenance and residence. Nevertheless, this block is put at the end of the survey in order to encourage the respondents to finish the filling with light personal questions in the last page. These factors are relevant influencer of consumer and allow segmenting the market.
When looking at the gender of the interviewees, male respondents accounted for 59% of the sample, against the 41% of female respondents. The age distribution of the sample is concentrated in the lowest ranges, the first two brackets 18-23 and 24-28 represent the 77% of the sample. Accordingly, the most frequent occupation is “student”, followed by “employee” and “internship”. Students and employees represent together the largest part of the sample, nearly 65%. Considering provenience, the Italian respondents were the absolute majority, 55.3% coming from North Italy, 16.3% from Central Italy and 20% from South Italy, barely the 8.4% was non-Italian. “City centre” and “Close the city centre” accounted for the 61.3% of the responses regarding the area of residence.

The first feature emerging from the answers in the purchasing habits section is the preponderance of the “Specialized magazine” as a reliable source of information. In the age of the Internet, the appeal of the periodical is still very high. However web factors come into play: 34.6% of the answers is divided into researches through “Specialized forums and blogs” (18.8%) and “Web search engine” (15.8%). What is losing importance is one of the traditional ways of approaching to the information. “Information pack from local dealers” is becoming obsolete because of the above-mentioned Internet generation explosion, as well as advice from friends or parents. Despite buying a car involves spending a significant amount of money and spend time gathering information, people consider easier and faster find out opinions and characteristics in a website, rather than going physically to the local dealer, and discuss with a professional seller.

Here below a bar chart represents the answers regarding respondents own cars, while a clustered by producer’s country origin bar chart shows the weight of the most representative countries, led by Germany and Italy.
Results

Factor Analysis and Cluster Analysis

A focus group was established in order to identify the most important items in the choice of a car. The interview was conducted in an unstructured and natural way, and the respondents gave their free opinion about
their perceptions, opinions, beliefs and attitudes towards the car. In particular, the interactive group made up of 10 people, was stimulated to focus on the main drivers to take into consideration when buying a new car.

From the focus group emerged 16 variables, and these drivers have been revised for the questionnaire with Likert scale, a symmetric agree-disagree scale for a series of statements evaluated from 1 (strongly disagree), to 7 (strongly agree). The 16 statements are reported below with their means, the standard deviation and the sum. In the final survey they were mixed randomly.

<table>
<thead>
<tr>
<th>Tab. 1. Survey Items</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Analysis N</th>
</tr>
</thead>
<tbody>
<tr>
<td>I use the car to hang out with my friends, go out by night, go to clubs and pubs</td>
<td>4.82</td>
<td>1.466</td>
<td>300</td>
</tr>
<tr>
<td>I will choice a certain car in order to distinguish myself from other people</td>
<td>4.46</td>
<td>1.429</td>
<td>300</td>
</tr>
<tr>
<td>When I consider a car, I like to compare the different models’ design</td>
<td>5.39</td>
<td>1.201</td>
<td>300</td>
</tr>
<tr>
<td>A label reputation is a byword for safety</td>
<td>4.66</td>
<td>1.360</td>
<td>300</td>
</tr>
<tr>
<td>I can mention several eco-friendly car models</td>
<td>3.61</td>
<td>1.678</td>
<td>300</td>
</tr>
<tr>
<td>I am disposed to spend up to 20% more for a hybrid or electric car rather than the same with traditional engine</td>
<td>3.68</td>
<td>1.839</td>
<td>300</td>
</tr>
<tr>
<td>I consider the social and environmental policies of a brand before buying a car</td>
<td>3.57</td>
<td>1.729</td>
<td>300</td>
</tr>
<tr>
<td>I take into consideration eco-incentives before buying a car</td>
<td>4.22</td>
<td>1.860</td>
<td>300</td>
</tr>
<tr>
<td>I use the car mainly to go to work or to turn an errand</td>
<td>3.38</td>
<td>1.452</td>
<td>300</td>
</tr>
<tr>
<td>When I choose the car, I am looking for a good quality/price ratio</td>
<td>5.25</td>
<td>1.373</td>
<td>300</td>
</tr>
<tr>
<td>Maintenance costs are a determinant factor in my choices about cars</td>
<td>5.33</td>
<td>1.445</td>
<td>300</td>
</tr>
<tr>
<td>I always consider the solidity and the practicalness of a vehicle before buying it</td>
<td>5.73</td>
<td>1.279</td>
<td>300</td>
</tr>
</tbody>
</table>
The factor analysis was implemented in order to check the significance of each item and reduce the number of the factors explaining the phenomenon under investigation, thanks to an aggregation in macro-variables. The four extracted factors explain the 53.66% of the total variance. The last column labelled “Rotation Sums of Squared Loadings” shows the eigenvalues after rotation. After their optimization, the values do not change considerably, the distribution is less wide and goes from the 18.44% of the first factor to the 10.13% of the fourth factor.

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigenvalues</th>
<th>Extraction Sums of Squared Loadings</th>
<th>Rotation Sums of Squared Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>% of Variance</td>
<td>Cumulative %</td>
</tr>
<tr>
<td>1</td>
<td>3,453</td>
<td>21,580</td>
<td>21,580</td>
</tr>
<tr>
<td>2</td>
<td>2,215</td>
<td>13,844</td>
<td>35,424</td>
</tr>
<tr>
<td>3</td>
<td>1,576</td>
<td>9,850</td>
<td>45,274</td>
</tr>
<tr>
<td>4</td>
<td>1,342</td>
<td>8,389</td>
<td>53,663</td>
</tr>
<tr>
<td>5</td>
<td>1,027</td>
<td>6,417</td>
<td>60,080</td>
</tr>
<tr>
<td>6</td>
<td>.937</td>
<td>5,856</td>
<td>65,936</td>
</tr>
<tr>
<td>7</td>
<td>.819</td>
<td>5,116</td>
<td>71,052</td>
</tr>
<tr>
<td>8</td>
<td>.722</td>
<td>4,510</td>
<td>75,562</td>
</tr>
<tr>
<td>9</td>
<td>.652</td>
<td>4,075</td>
<td>79,637</td>
</tr>
<tr>
<td>10</td>
<td>.582</td>
<td>3,636</td>
<td>83,272</td>
</tr>
<tr>
<td>11</td>
<td>.560</td>
<td>3,503</td>
<td>86,775</td>
</tr>
<tr>
<td>12</td>
<td>.509</td>
<td>3,183</td>
<td>89,958</td>
</tr>
<tr>
<td>13</td>
<td>.480</td>
<td>2,998</td>
<td>92,956</td>
</tr>
<tr>
<td>14</td>
<td>.437</td>
<td>2,733</td>
<td>95,690</td>
</tr>
<tr>
<td>15</td>
<td>.412</td>
<td>2,577</td>
<td>98,266</td>
</tr>
<tr>
<td>16</td>
<td>.277</td>
<td>1,734</td>
<td>100,000</td>
</tr>
</tbody>
</table>

Tab. 2. Factor Analysis. Total Variance Explained
The “Communalities” table reminds the single factors’ variance percentage; before the extraction the communalities (the proportion of common variance within a variable) are all 1.00, but once extracted and a part of information is lost, is possible to estimate the effective common variance. For instance, the first factor has a 50.3% of shared variance. The 53.66% of explained variance, is indeed an average value of all the single variables, fluctuating between 36.9% and 72.1%. In fact the sum of the extracted factors dived by 16 is equal to 53.66% again.

Even Kaiser’s criterion of retaining all factors with eigenvalues greater than 1 is on the edge here, since the fifth factor has an eigenvalue of 1.027. After some operational considerations, it was decided to consider four factors.

<table>
<thead>
<tr>
<th>Tab. 3. Communalities</th>
<th>Initial</th>
<th>Extraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>I use the car to hang out with my friends, go out by night, go to clubs and pubs</td>
<td>1,000</td>
<td>.503</td>
</tr>
<tr>
<td>I will choice a certain car in order to distinguish myself from other people</td>
<td>1,000</td>
<td>.498</td>
</tr>
<tr>
<td>When I consider a car, I like to compare the different models’ design</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td>A label reputation is a byword for safety</td>
<td>1,000</td>
<td>.430</td>
</tr>
<tr>
<td>I can mention several eco-friendly car models</td>
<td>1,000</td>
<td>.573</td>
</tr>
<tr>
<td>I am disposed to spend up to 20% more for a hybrid or electric car rather than the same with traditional engine</td>
<td>1,000</td>
<td>.618</td>
</tr>
<tr>
<td>I consider the social and environmental policies of a brand before buying a car</td>
<td>1,000</td>
<td>.597</td>
</tr>
<tr>
<td>I take into consideration eco-incentives before buying a car</td>
<td>1,000</td>
<td>.493</td>
</tr>
<tr>
<td>I use the car mainly to go to work or to tune an errand</td>
<td>1,000</td>
<td>.369</td>
</tr>
<tr>
<td>When I choose the car, I am looking for a good quality/price ratio</td>
<td>1,000</td>
<td>.653</td>
</tr>
<tr>
<td>Maintenance costs are a determinant factor in my choices about cars</td>
<td>1,000</td>
<td>.420</td>
</tr>
<tr>
<td>I always consider the solidity and the practicalness of a vehicle before buying it</td>
<td>1,000</td>
<td>.470</td>
</tr>
<tr>
<td>With my I car I would like to go on track days</td>
<td>1,000</td>
<td>.618</td>
</tr>
<tr>
<td>I would like to buy cars only with more than 200 horsepower</td>
<td>1,000</td>
<td>.721</td>
</tr>
<tr>
<td>When I choose a car, I am looking for a good 0-100 sprint</td>
<td>1,000</td>
<td>.617</td>
</tr>
<tr>
<td>When I choose a car I inquiry about the maximum speed and the road-holding</td>
<td>1,000</td>
<td>.603</td>
</tr>
</tbody>
</table>
The factor loadings matrix responds to the first proposition of the analysis, showing that eco performances are a significant driver when buying a new car. The output presented by the “Rotated Component Matrix” shows the correlations between the original variables and the detected components (factor loadings). Each variable is associated to a particular factor with the highest correlation after orthogonal rotation Varimax with Kaiser Normalization that has the aim to minimize the number of variables with high saturation for each factor. The result of the analysis is the determination of four macro-component that include the original 16 items:

The first component is called Performance and embraces the items “With my I car I would like to go on track days”; “I would like to buy cars only with more than 200 horsepower”; “When I choose a car, I am looking for a good 0-100 sprint”; “When I choose a car I inquiry about the maximum speed and the road-holding;

The second component is defined Functionality and encloses “I use the car mainly to go to work or to run an errand”; “When I choose a car, I am looking for a good quality/price ratio”; “Maintenance costs are a determinant factor in my choices about cars”; and “I always consider the solidity and the comfort of a vehicle before buying it”;

The third component is labelled as Eco-friendly and encompasses the items “I can mention several eco-friendly car models”; “I am disposed to spend up to 20% more for a hybrid o electric car rather than the same with traditional engine”; “I consider the social and environmental policies of a brand before buying a car”; and “I take into consideration eco-incentives before buying a car”;

The last macro-component is classified as Brand appeal and it includes the items “I use the car to hang out with my friends, go out by night, go to clubs and pubs”; “I will choice a certain car in order to distinguish myself from other people”; “When I consider a car, I like to compare the different models’ design”; “A label reputation is a byword for safety”.

Once the number of items has been reduced from 16 to 4 factors, it was possible to proceed with the cluster analysis of the sample, in order to understand more about the potential presence of homogeneous groups. With the K-means method, the choice was to assume 4 clusters, and in this way it was possible to

<table>
<thead>
<tr>
<th>Tab. 4. Rotated Component Matrix</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>I use the car to hang out with my friends, go out by night, go to clubs and pubs</td>
<td></td>
</tr>
<tr>
<td>I will choice a certain car in order to distinguish myself from other people</td>
<td></td>
</tr>
<tr>
<td>When I consider a car, I like to compare the different models’ design</td>
<td></td>
</tr>
<tr>
<td>A label reputation is a byword for safety</td>
<td></td>
</tr>
<tr>
<td>I can mention several eco-friendly car models</td>
<td></td>
</tr>
<tr>
<td>I am disposed to spend up to 20% more for a hybrid electric car rather than the same with traditional engine</td>
<td></td>
</tr>
<tr>
<td>I consider the social and environmental policies of a brand before buying a car</td>
<td></td>
</tr>
<tr>
<td>I take into consideration eco-incentives before buying a car</td>
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</tr>
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<td>Maintenance costs are a determinant factor in my choices about cars</td>
<td></td>
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<tr>
<td>I always consider the solidity and the practicalness of a vehicle before buying it</td>
<td></td>
</tr>
<tr>
<td>With my I car I wolud like to go on track days</td>
<td></td>
</tr>
<tr>
<td>I would like to buy cars only with more than 200 horsepower</td>
<td></td>
</tr>
<tr>
<td>Whn I choose a car, I am looking for a good 0-100 sprint</td>
<td></td>
</tr>
<tr>
<td>When I choose a car I inquiry about the maximum speed and the road-holding</td>
<td></td>
</tr>
</tbody>
</table>
obtain a model with a perfect statistical significance (p-value is 0.000 for each cluster). In addition, the population of each cluster shows a good homogeneity. The Final Cluster Centers table shows the mean of the clusters for each variable used in the process, and in this way it is possible to discover the characteristics of the clusters compared with other variables used. Ranking each factor, the output highlights 4 clusters:

<table>
<thead>
<tr>
<th></th>
<th>Cluster 1</th>
<th>Cluster 2</th>
<th>Cluster 3</th>
<th>Cluster 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance</td>
<td>1,18299</td>
<td>-0,70566</td>
<td>-0,01400</td>
<td>-0,42496</td>
</tr>
<tr>
<td>Functionality</td>
<td>0,40615</td>
<td>0,25412</td>
<td>-1,53049</td>
<td>0,46413</td>
</tr>
<tr>
<td>Eco-friendly</td>
<td>-0,03261</td>
<td>-0,35253</td>
<td>0,03543</td>
<td>0,57347</td>
</tr>
<tr>
<td>Brand appeal</td>
<td>0,18197</td>
<td>0,58185</td>
<td>-1,0281</td>
<td>-1,07524</td>
</tr>
</tbody>
</table>

Cluster 1/Enthusiast (82 individuals): it is a group of people really cars-lovers, always attentive and updated to the latest news. They judge a car on the design and the appeal, but especially looking at driving dynamics, performances, safety, and comfort. Their perfect car is technically valid, eye-catching, solid and reliable, but they are not so keen on considering the environmental issue as a crucial point. They might consider green features as clashing with the performances of a vehicle.

Cluster 2/Conspicuous (99 individuals): they are people who care only about the brand. In their opinion, be part of an elite and distinguish from other people is fundamental, and achievable through the ownership of a prestigious brand. It does not matter if the performances are poor or excellent, or the emissions observe the latest standards, in their view a high brand reputation means safe and reliable cars. People in this group pay attention to the design of a car that should be eye-catching in order to communicate a good image of the owner.

Cluster 3 / Uninvolved (57 individuals): this is the less numerous group including people who are not interested in the argument, so less informed and influenced in the purchasing behaviour from friends and family. Here the car is seen as a means of transportation rather than a symbolic product or something offering emotions.
Cluster 4 / Eco-practical (62 individuals): it is a group uninterested in brand appeal or in performances, they recognize the functional features and the ecological orientation as fundamental when considering to buy a new vehicle. Maintenance costs, solidness, comfort, emissions, environmental and social impact, value for money, are the key words for these people.

The Positioning

Through a top of mind process, respondents were asked to indicate the first three automotive brands in their mind when thinking about a car. Then, they evaluated each chosen brand in four aspects: “functionality”, “brand allure”, “performance” and “eco-sustainability” with Likert scale from 1 (strongly disagree), to 7 (strongly agree).

Afterwards, it was decided to study the brands’ positioning, with particular reference to cluster number 4, the eco-practical, in order to find evidence for proposition number 2.

It was decided to consider the brands with a total score of more than 20 preferences. These are: BMW, Audi, Fiat, Ferrari, Alfa Romeo, Mercedes-Benz, Porsche, Volkswagen, Lamborghini, Toyota.

Premium car manufacturers. BMW was the top of the choices in the test (150/900 preferences). In each two-measure correlation, the “eco-sustainability” value never reach a univocal evaluation in its case. Audi (126/900 preferences) is in the second position according to respondents’ choice. The dynamics of the matrix are almost the same of the Bavarian manufacturer. The producer from Ingolstadt has results a little less concentrated towards the top of the “eco-sustainability” variable and nearer to the means of the scale. Despite a few superior evaluations, it has the worse sustainable perception among the eco-friendly users, even if Figure 13 reminds that Audi has the best fleet consumption against BMW and especially Mercedes-Benz. Maybe the Four-Ring automaker suffers the lack of an eco-label, which could grab the attention of the eco-practical consumers. It might also be that Audi experiences an inferior awareness because of the massive use of platforms and components sharing strategies. Mercedes-Benz (66/900 preferences) is the third of the German trio in this ranking with almost half the preferences collected by Audi. The
outcomes in terms of eco-sustainability are again a bit over the means of the scale but less scattered than the others premium producers.

Generalist car manufacturers. In this section, Fiat gained a good number of choices (77/900 preferences). Despite the effort of building greener vehicles and work on the social responsibility, the respondents did not reward Fiat with a univocal rating. In fact, the cluster is not clearly grouped showing a positive correlation between “eco-sustainability” and the other three factors. The other Italian manufacturer in this block is Alfa Romeo (77/900 preferences), which is part of the Fiat Group with also Lancia, Ferrari and Maserati. Here again the respondents’ perception seems not very lucid: nobody evaluated with top scores the “eco-sustainability”, the values in relation with the other traits are mostly on average with negative peaks when tied to “functionality” and “performance”, while “brand allure” is the less negative. Volkswagen (77/900 preferences) shows the most aligned values in terms of “eco-sustainability” and in correlation with the other factors the scores are always just over the average. Toyota (22/900 preferences) has a modest number of respondents, but it is interesting to see how the Japanese manufacturer has completely opposite concentration groups. Bad evaluations about its performances are followed by good assessments in functionality and ambiguous references in brand appeal, while the “eco-sustainability” items depicts contrasting opinions, revealing a massive misunderstanding in the brand perception.

Sport-luxury car manufacturers. In this section Ferrari (72/900 preferences) and Porsche (48/900 preferences) have almost identical matrix in terms of sustainability. Also Lamborghini (22/900 preferences) shows similar results. The “eco-sustainability” label seems to clash with the nature of the models produced in the sport-luxury segment, since powerful cars with big engines produce higher emission and show less efficiency than an average engine.

Discussion

Results emerging from the analysis are not easy to read, and numerous facets must be taken into considerations. First of all, even though the factor analysis confirms proposition 1, analysing the descriptive statistics of
the four items defined in the group eco-friendly, it is possible to observe that their average evaluation is below the global mean of 4.205. In detail only the item “I take into consideration eco-incentives before buying a car” has reached a value on the average (4.22). This suggests that consumers are driven mainly by the personal benefit appeal. The items “I can mention several eco-friendly car models” and “I consider the social and environmental policies of a brand before buying a car” demonstrate a poor involvement of consumers in the green issue, since they are not able to mention green models and they do not care much about Green Marketing and CSR policies upstream. Also the statement “I am disposed to spend up to 20% more for a hybrid or electric car rather than the same with traditional engine” had poor results, and in spite of the savings and the ecological advantages provided by green cars, a large number of respondents is not disposed to pay more for alternative fuel cars. In short, consumers recognize the importance of green features when considering to buy a new car, but this awareness does not go through an actual commitment stage.

Several exogenous causes might explain this outcome. First, there are a number of technical difficulties related to the product, as buying a hybrid vehicle means: installing an EV outlet at home, limited trip range, difficulties in recharging the batteries once far from home. In addition, as showed by people in the cluster “enthusiasts”, car lovers are generally against the use of alternative fuels because in their opinion cars lose appeal when the sound is not a traditional rumble and the smell is not burnt gasoline.

The top of mind awareness was useful to get the picture of the most recognized brands among car manufacturers, in this way it has been easier to test the impact of brand familiarity on consumers’ judgement. Premium car manufacturers Audi, BMW and Mercedes-Benz, have recorded very similar results and in every correlation there is not a clear polarization. A certain confusion pools these manufacturers, since they have the wider range of models which covers almost all classes, going from the premium small family-car (Audi A3, BMW 1 Series, Mercedes-Benz A-Class) to fast and performing sports sedan (Audi RS4, BMW M3, Mercedes-Benz C63 AMG). This leads the consumer to consider each brand in a ambiguous way. Again, the consumers are torn between the premium BMW and Mercedes-Benz’s eco-labels Efficient Dynamics and BlueTec and the production of SUVs (Audi Q7, BMW X5, Mercedes-Benz ML-Class) or full-size
luxury vehicles (Audi A8, BMW 7 Series, Mercedes-Benz S-Class) with low efficiency and high emissions. Furthermore, this unclear awareness could derive from of the massive use of platforms and components sharing strategies with other generalist and low-cost car manufacturers.

When looking at generalist car manufacturers, Fiat, Alfa Romeo, Volkswagen and Toyota, the results show an irregular polarization once more, but with different features. Indeed, the cluster is not clearly grouped and in addition a general tendency of positive correlations between “eco-sustainability” and the other factors is shown. This phenomenon is more evident in the cases of Fiat and Alfa Romeo. Volkswagen has a more vertical tendency line which highlights a good average score. Toyota deserve a specific mention because the Japanese manufacturer is widely known for its environmentally friendly strategy, led by the iconic Prius. The Environmental Action Plans, constantly implemented through the years, allowed Toyota to reach several environmental records, such as being the second most ecological car manufacturer in United States, and win three times in a row the Sustained Excellence Award⁴. Additionally, Toyota is fully involved in philanthropic initiatives and diversity preservation policies, like the Toyota USA Foundation and the Toyota Family Literacy Program that helps low-income families⁵. Despite these acknowledgments, Toyota has been chosen few times (22) and among the respondents only a small number of them were in the cluster of eco-practical. In addition the results are controversial, as they are polarized at the opposite side. This demonstrated a big misunderstanding in how the brand is considered: a first clue of the effect of the brand familiarity bias.

Moreover, the more consumers consider the brand as appealing, well-performing and functional to all the needs, the more they see it as ecological and vice versa. High values in the eco-friendly factor associated to high performances supports this bias. Sport-luxury car manufacturers Ferrari, Porsche and Lamborghini reveal a common path and same results in the analysis. First thing to notice is the confusion on the environmental matter, since this segment has the worst environmental performance due to cars low efficiency and high fuel consumptions. For instance a 2009 Ferrari 458 Italia V8 produces 307g/km of CO2, a new Porsche Cayenne Turbo produces 270 g/km of CO2, a 2009 Lamborghini Gallardo Spider 5.3

liter produces 330g/km of CO2, a 2010 Alfa Romeo MiTo produces only 98 g/km of CO2, which is less than one-third compared to Lamborghini’s.\(^6\) However, consumers seem not to be aware of this higher environmental impact, as the points are distributed all along the ranking range in every correlation, except for the correlation with “functionality”, where the values are polarized towards the lowest levels, apparently judging a sport car as not functional in everyday life. Only Porsche has anyway better values in this sub-matrix thanks to a soberer design and smaller engines. Once again the high level of brand reputation associated to manufacturers belonging to this segment is driving consumers’ opinions. Furthermore, the high visibility of such brands overemphasises their efforts to become more environmentally friendly. Top producers are investing in eco-friendly factories with cutting edge technology, where they develop high-efficiency models, for instance Ferrari introduced the HELE system on the model California, which stands for “High Emotion Low Emissions”. Although almost every brand in this segment is introducing new eco-friendly models or concept-cars, Ferrari CEO Amedeo Felisa pointed out the heart of the matter for sport-luxury car manufacturers: “we are forced to by the regulations […] The issue of emissions for Ferrari is more a political one than real one […] Lowering emissions of every Ferrari will not save the planet, but it will cost us a lot of money.”

Conclusion

This study confirms that GM strategies implemented by car manufacturers succesfully raised the awareness of consumers on sustainability issues. However, the gap separating recognition of the issue from enactment of environmentally friendly consumption is still to be filled. In addition, without a well-shaped opinion about the eco-sustainability of each brand, consumers extended their general opinion concerning the manufacturer when answering to environmental related items.

Still, it is true that consumers are moving from first “innovators” to “early adopters” who “are typically younger in age, have a higher social status, have more financial lucidity, advanced education, and are more socially

\(^6\) http://www.quattroruote.it/listino/
forward than late adopters. More discrete in adoption choices than innovators. Realize judicious choice of adoption will help them maintain central communication position” (Rogers, 1962). Drivers have to take into consideration a number of trade-offs, principally regarding the difficulty in recharging while undertaking long trips. The previsions estimate that this weakness will be solved in the upcoming years by introducing more efficient batteries and more recharge-station. A Deloitte survey draws attention to the “range anxiety issue”: US respondents says that few of them would travel more than 150km in an ordinary day, so an electric car with a range of 80 km will please more than 65% of the drivers on week- days. However 70% of the drivers expect an electric car to travel more than 480km at least7.

Bearing in mind the industry-specific factors, the gap analysis is able to point out that actually firms do not use resources properly in the face of large investment sin efficient technologies. Indeed, it is possible to identify four different gaps:

**Product gap:** it indicates the discrepancy between the green product as expected by drivers and the current green car, which presents some usability limitations as remarked before. This is a kind of “technological gap” for the reason that green solutions are still evolving and their upcoming path is still not fixed.

**Pricing gap:** when asked if disposed to spend 20% more for a green car rather than traditional car, customers’ answer were considerably under the average value, although the potential savings in fuel’s cost and the less polluting impact on the environment are valid motivations to pay more.

**Communication gap:** The lack of an adequate communication is the main cause of the misunderstanding emerged here, and every brand should be more focused in promoting its own green models, keeping in mind the brand familiarity bias. According to the survey, many respondents do not have a real awareness of the green issue, or they are not able to identify properly the greenest brands. The green cause seem to be an universal common factor for every car manufacturer, form Fiat to Porsche,

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but on the other side, it seems to be a not-so-common factor among the consumers.

**Eco-managerial gap**: managerial researches underscore that more than 90% of CEOs think that the CSR issue will be decisive to the upcoming success of their firms\(^8\). In this sense, Chief Green Officers may have a key role to integrate environmental and social goals with economic targets, in a triple bottom line approach.

Car manufacturers need to use the right tools to fill these gaps. Only firms ready to accept the current challenge will be able to face the crisis and catch the opportunities generated by market pressure in terms of green demand. Defining exactly the future profile of this industry, from now to 20 years, is nearly impossible. Many are betting on the electrification of the transports, but new models of mobility, like the car sharing, are emerging with several benefits for the environment. Peugeot’s initiative “mu by Peugeot” entails a different concept of mobility based on vehicles sharing of cars, vans, scooters, bikes and accessories, and soon it will include an “electromobility” program. By means of a series of industry-specific aspects like strategies, networks, partnerships, know-how and managerial competences, automotive has the new vital mission of challenging the way of interpreting the concept of mobility. Innovative business models will have the tough duty to integrate software and hardware, services and products, in order to generate alternative sales sources. Change is the distinguishing mark of the automotive industry of the next age, so every firm should be open to learn from the experience of other industries and interact with contiguous businesses, flexible to integrate new business and trends into a holistic approach, be courageous to develop alternative innovations and catch opportunities. Altogether, an industry-level cultural change is essential to face challenges and opportunities ahead.

In conclusion, this work has started to assess the actual effectiveness of GM strategies, a topic that deserves a deeper and vaster analysis, making contributions for both academia and practitioners. New research avenues are still open, future studies might analyze in more detail the antecedents and determinants of consumers’ reaction to GM initiatives.

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\(^8\) A new era of sustainability: UN Global Compact - Accenture CEO study. UN Global Compact - Accenture CEO 2010.
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Authors of the chapters 195
Monograph:

CSR Trends. Making a difference.

Rudnicka Agata (ed.)

The chapters included in the volume were a subject of the double blind peer review process. The reviewers were as follows (in alphabetical order):
Dominik Drzazga, Ph.D.
Jacek Dymowski, Ph.D.
Piotr Rogala, Ph.D.
Maciej Turała, Ph.D.

Publisher:

Centrum Strategii i Rozwoju Impact (CSR Impact)
ul. Zielona 27, 90-602 Łódź, Poland
biuro@csri.org.pl

Design and graphic layout: Spóła Działa / www.spoladziala.pl

Łódź (Poland) 2015
E-book
ISBN: 978-83-932160-7-9

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CSR Trends
Making a difference

Editor
Agata Rudnicka

Centrum Strategii i Rozwoju Impact (CSR Impact)
Łódź (Poland) 2015
ISBN: 978-83-932160-7-9