Satisfaction of bi-fuel car owners: pro-environmental versus economic determinants

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Abstract

This paper is aimed to study the pro-environmental determinants related to the buying decision of a NGV (Natural Gas Vehicle). Starting from previous research here we want to understand how the decision to buy a NGV has been pushed by economic reasons and/or by the need of the motorists to contribute personally to reduce air pollution in the metropolitan area. The existence of this latter determinant would reinforce the growing perception of ethical and conscious behaviour of the consumer (in this case the motorist) and therefore will require to focus the attention as well to the level of eco-sustainability satisfaction of the customer and their antecedents. The paper is based on a field study of 400 motorists in the metropolitan area of Milan. The findings confirm the existence of pro-environmental motives at the base of the decision and show as well the nature and the level of satisfaction of the respondents towards the decision to buy a NGV.

Keywords :

Satisfaction, environmental awareness, customer behaviour , natural gas vehicle .

Introduction

The study of consumer behaviour has many pitfalls since it is influenced by many subjective determinants almost never confined to rationality only. The aim to study the behaviour of the consumer when it includes also pro-environmental purposes is more intriguing being influenced by deep personal values and social atmosphere and constraints as well.

This would require a proof awareness of the essence of ethic behaviour and a robust approach to study it, for instance, in an ethic consumer satisfaction measurement perspective.

This paper is devoted to study a particular example of buying decision that is represented by the decision to have a NGV (Natural Gas Vehicle) instead of a traditional gasoline or diesel engine car. Actually this decision could combine both economic determinants and potentially pro-environmental motives connected to the desire to prevent the environment from air pollution increase. We know that this decision is certainly driven by an economic reason (gasoline cost increase compared to the relative stable cost of automotive gas) but we presume also that a component of the decision can be found in an increasing desire to act socially in respect of other people and the environment too. In order to analyse in depth this issue we try to portray the framework in which the ethic consumer decides, and further more to confirm the level of satisfaction related to this specific eco-sustainable decision. To pursue these goals we test a model by an empiric dataset of NGV buyers. Before describing the field research and the main results, we introduce some elements taken from the literature related to the conscious consumer behaviour and form the literature about customer satisfaction analysis.

The "conscious consumer" between behaviour intentions and decisions

The study of the attitude of the customer to adopt an environmental friendly behaviour started with Berkowitz and Lutterman (1968), and Anderson and Cunningham (1972), who broke new ground by studying the profile of socially responsible consumers (Laroche et al. 2001). But this kind of research field is not unique being part of a broader consumption picture (Szmigin and Carrigan, 2006).

Indeed, environmentally conscious consumers do not form a solid, homogeneous consumer segment but act in many different ways. Different new consumption activities and lifestyles, arising from social ideologies, represent typical postmodern structures (Bouchet, 1994). The conscious consumer (Szmigin, Carrigan and McEachern 2009) is said to express consumer's new values concerning environmental and other facet related to humanity such as well-being (Stern, 2000). Commitment can be said one element that may differ from the classic consumer behaviour. Actually environmental motives are often an expression of ideological standpoint on consumption (Stern, 2000; Moisander and Pesonen, 2002) and in this perspective are more rooted, but at the same time more experienced and problematic, as we can see later.

As suggested by Haanpää (2007) compared to general consumer behaviour the conscious one differs at least by two reasons:

a. conscious consumer behaviour encompasses an assessment based purely on benefits and costs, in an individualistic way, demonstrating a wider behaviour aimed to evaluate as well the social impact of the decision;

b. differently from traditional consumers, the conscious ones do not look for immediately realization of their needs but instead they are driven by a future-orientated outcome (e.g. a cleaner environment) that often benefits society as a whole.

Among a number of studies which have concentrated on conscious behaviour many of them (Wicker, 1969; Webster, 1975; Ajzen and Fishbein, 1980) have clearly demonstrated another characteristic of this particular consumer behaviour. It can be useful to predict behaviour (intention), but the relationship between attitudes and real behaviours has been much weaker than expected. Consequently, studies show that consumers have a high preference for ethical or 'green' products, but the consistency between consumer attitudes and behavioural measures is rather low (Rokka and Uusitalo 2008).

This has led recent empirical work to engage a qualitative approach to the study of conscious consumption (Craig-Lees and Hill, 2002; Bekin et al., 2005; Thompson and Coskuner-Balli, 2007; Connolly and Prothero, 2008). The conscious consumer shows often a complex mix of behaviours that sometimes are also in competition and therefore creates clash and uncertainty of direction. Their decisions, focused on the sensitivity selection among ethical alternatives, are always based on complex attitudes, inclinations and lifestyle goals. A range of ethical concerns and competencies impacts upon each individual's everyday consumption practices that can reveals the "competing priorities, paradoxical outcomes, and the nature of compromises reached in real decision processes" (McDonald et al., 2006).

Since the experience of consumption is often social rather than individual (Carù and Cova, 2003), it becomes more complicated, for the conscious consumer, to gain a clear and rationale insight of the decision to take. Szmigin, Carrigan and McEachern (2009) suggests that in these circumstances, two elements characterise the conscious consumer behaviour: flexibility and inconsistency.

Flexibility is a means by which to balance opposite forces related to consumption like mood, price, quality, convenience, taste and the desires of other people that are closed to them (Slater and Miller, 2007). This means that the rationale attitude to predict behaviour and therefore to link intentions to facts is reduced since, in between intentions and behaviour, flexibility works to maintain integrity and alignment of the values of the consumers and the decision taken which in turn is a compromise with many external factors.

While flexibility in conscious purchasing may represents a strategy for dealing with a complex decision environment, it is also closely linked to feelings of self and morality (Szmigin, Carrigan and McEachern, 2009).

The second aspect outlined is the potential inconsistency of the decision taken and the attitude of the conscious consumer to accept it. We face inconsistency when there is a break between self-concept, values and behaviours and this generates dissonance. Dissonance is a consequence of behaviour which is against to personal moral and global integrity (Steele et al., 1993). In turn, global integrity is maintained by self-affirmation that starts to work when something threatens the existing image. The process involves continued interpretations and reinterpretations of experiences to maintain an overall image of self-integrity. This does not necessarily mean that each threat is dismissed, but rather than the person may leave it un-rationalized and affirms some other important aspects that act to support their self-adequacy (Szmigin, Carrigan and McEachern 2009). The theory on dissonance shows a number of strategies that people may take in this situation (Harmon-Jones and Mills, 1999) such as altering aspects of the decision alternatives to reduce dissonance or trivializing the decision.

These considerations help us to clarify better how is complicated and more blurred to depict the profile of the conscious consumer and definitively interpret his behaviour.

In this surrounding arena we try to broaden the motives and the satisfaction of motorists who have decided to buy an NGV or to convert the old gasoline one owned.

Before showing how the research put in place has been administered and the emergent results available, a brief chapter is dedicated to the analysis of the existing literature about customer satisfaction and the models that can be utilised to perform a kind of research. Indeed our path to support the conscious consumer analysis is based on the study of the relevant attributes of the customer satisfaction since it is a fundamental step to evaluate consumer behaviour.

The measurement of customer satisfaction

Consumer research has been exploring the psychological determinants of customer satisfaction since sixties. The disconfirmation paradigm (Cardoso, 1965; Churchill and Surprenant 1982; Fornell, 1992; Anderson and Sullivan, 1993; Anderson, Fornell and Lehmann 1994) has became the most used and relied on among many models such as the equity theory and the value-percept disparity (Frank and Enkawa 2009).

The disconfirmation of expectations model describes customer satisfaction as a comparison between the post-purchase perceived quality of goods and services and pre-purchase quality expectations (Cardozo, 1965; Olson and Dover, 1979).

According to this model (see figure 1), **satisfaction** or dissatisfaction is determined by the difference between the **customers' expectations** of a particular product or service and their

perceptions of the actual performance of this product or service. If the customers' expectations are fulfilled, the result is satisfaction; if not, dissatisfaction occurs.

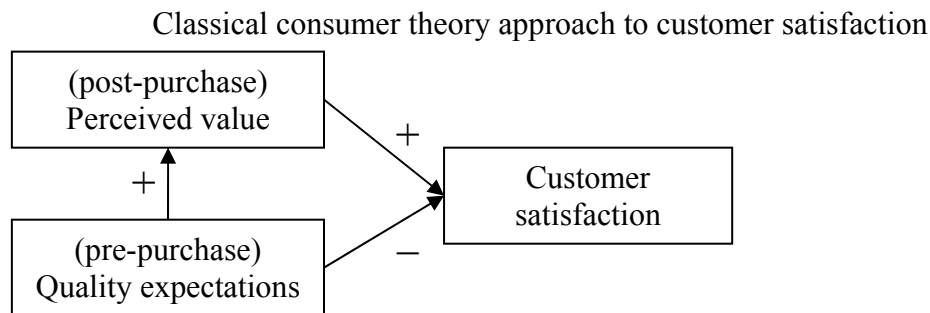Classical consumer theory approach to customer satisfaction

Figure 1 - a basic representation of the disconfirmation model for customer satisfaction (source: adapted form Frank and Enkawa (2009))

In addition to these three variables (satisfaction, expectations and performance) general model of satisfaction contains another element that is the **importance** of the service/product attribute under consideration. This variable is relevant because not all attributes are equally important to customers. In this way every variable is measured by two dimension: current evaluation and degree of importance.

In its essence the confirmation/disconfirmation model presents conceptual problems as clearly synthesized by Kanning and Bergmann (2009):

- ambiguity about the notion of "expectation";
- uncertainty about the effects of over-fulfilment of expectation;
- a failure to take into account absolute levels of expectation-performance difference (rather than simple relative difference between performance and expectation).

These problems arise since, as stated by Sheth, Newman and Gros (1991), value is not just limited to the functional aspects of quality and price, but may also include social, emotional and epistemic value components.

These last sources of value for the customer are sometimes ephemeral and based on idiosyncratic feeling that are not easy to detect also because they aren't always clear in the mind of the customer or reflect needs and motives that in turn are not rationale or are referred to subconscious.

Furthermore when we move from the analysis of customer satisfaction of a product to a service or a purchase that involves pro-environmental decision, the complexity of satisfaction analysis become exponential.

The quest for satisfaction measurement in pro-environmental decision contexts

The setting of a research to measure the satisfaction for the perceived value in the pro-environmental decision domain is not therefore free from any deep risks.

If we accept that four main attributes (distinction, hedonistic satisfaction, love and aesthetic appreciation) are basic to define the nature and the reason behind behaviours of conscious consumer (Szimigin and Carrigan 2006), it becomes clear how the investigation of the expectations and the perceived value of the customer, two key steps for customer satisfaction analysis, as seen before (see figure 1), is intrinsically problematic when related to the four attributes mentioned.

A recent study done by Szimigin, Carrigan and McEachern (2009) shows it in full shape. The participants of a qualitative and interpretative research depicted themselves as inconsistent and flexible in respect to environmental issue so that the researchers were induced to introduce the term conscious consumer instead of ethical consumer; exactly to demonstrate the peculiar aspect of fragility and insecurity related to the eco-sustainability approach of the people. The consumer, the one focused on environment, lives in a continuous dilemma among self-interests and social-ones and try unsuccessfully to accommodate them. This creates a sense of inconsistency in the behaviours that are not always reconcilable with eco-sustainable reasons and motives. In this perspective flexibility is seen as a way to accommodate the potential dissonance existing from expectations and behaviours and the way to absorb inconsistency.

It appears clear that this complex reconstruction of the conscious customer portrait can be done successfully with in depth interviews or by using other qualitative research methods. It becomes more intriguing to extend this kind of analysis in a massive setting in order to have a wider horizon for the specific pro-environmental phenomena.

Without any ambition to define new ways of conducting customer satisfaction analysis in the domain of pro-environmental purchase we tried to approach this issue in order to ascertain the relevance of two components (the economic and the pro-environmental) of the decision process to buy a NGV (Natural Gas Vehicle) or to convert the old gasoline owned.

Indeed this case seems to be very intriguing in the understanding of the pro-environmental drivers as, differently from many other cases, it does not show a sharp trade-off between respect for the environment and personal sacrifice. Although NGV have many restrictions and reduced performances compared to the gasoline or the diesel supplied, they have a great appeal as regards the running cost for the low price of fuel.

We face a situation where the decision to buy a NGV can be sustained both by economic drivers and by the desire to contribute personally to reduce air pollution. And these two motives can live together with no trade-off.

In this perspective it becomes difficult to separate the weight of each of the two component since they reinforce each other.

In order to understand better this phenomena, the author along with Savorgnani and Besana (Nadin, Savorgnani and Besana 2009) decided to study the NGV buying approach. In the first quarter of 2008, after a persistent fuel cost increase and the boom in NGV sold in Italy, we decided to study the pro-environmental intentions related to the purchase of cars. It is irrefutable that air pollution is a sharp issue in every metropolitan areas. Therefore the researchers decided to evaluate if the decision to buy a NGV were influenced also by the desire to contribute personally to pollution abatement.

The authors built a model aimed to evaluate the antecedent of the decision to buy a NGV or to convert the old gasoline one and consequently the corresponding level of satisfaction related to that purchase.

Figure 2 depicts the main research findings which can be in detail analysed referring to the research publication (Nadin, Savorgnani and Besana 2009).
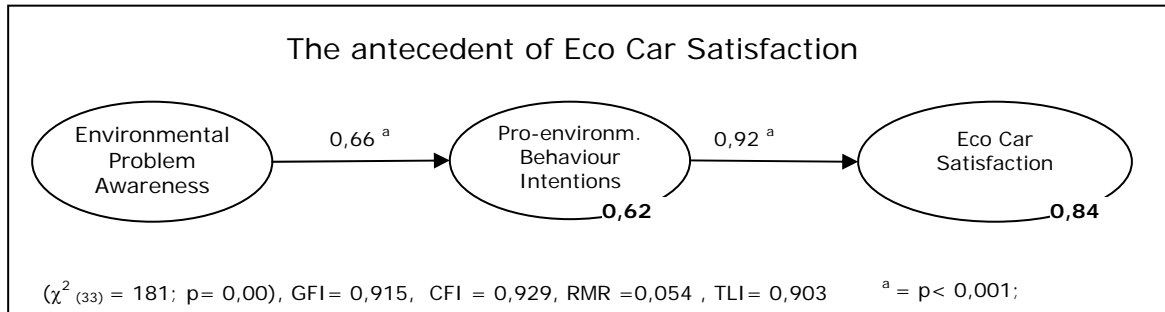

Figure 2 – An interpretative model for the antecedents of NGV buyer satisfaction (source : adapted from Nadin, Savorgnani and Besana 2009)

The purpose of that study was to understand if the motorists who decided to buy a NGV had included in their decisional scheme, in a rationale or irrational way, the environmental issue as a variable to take in consideration related to the purchase of a product that is particularly polluting.

The scheme of figure 2 represents the cause-effect nexus among three constructs and confirms the assumption that the interviewed motorists have decided to buy a NGV or convert the owned one taking care of environmental values.

General satisfaction of the interviewed is strong influenced by PBI (Pro-environmental Behaviour Intentions) and this is fed, in turn, by the motorist feeling of awareness for environmental problems.

So the respondents declared that part of their satisfaction (84%) was determined by eco-sustainable intentions and approach, inspired by the awareness of the fragile status of our environment and the quality of air in big towns.

Starting from these findings we want to broaden this analysis with the aim to understand better the component of the satisfaction of the owners of NGV's as previously stated.

It is undeniable that the decision to buy or convert a car is founded on a cost-effective basis, since the running cost (mainly fuel) is a very important driver for the choice among alternatives.

For this purpose we have defined a new interpretative model (represented in figure 3) which includes three basic hypothesises tested in this paper on the base of the data gathered during the original survey.
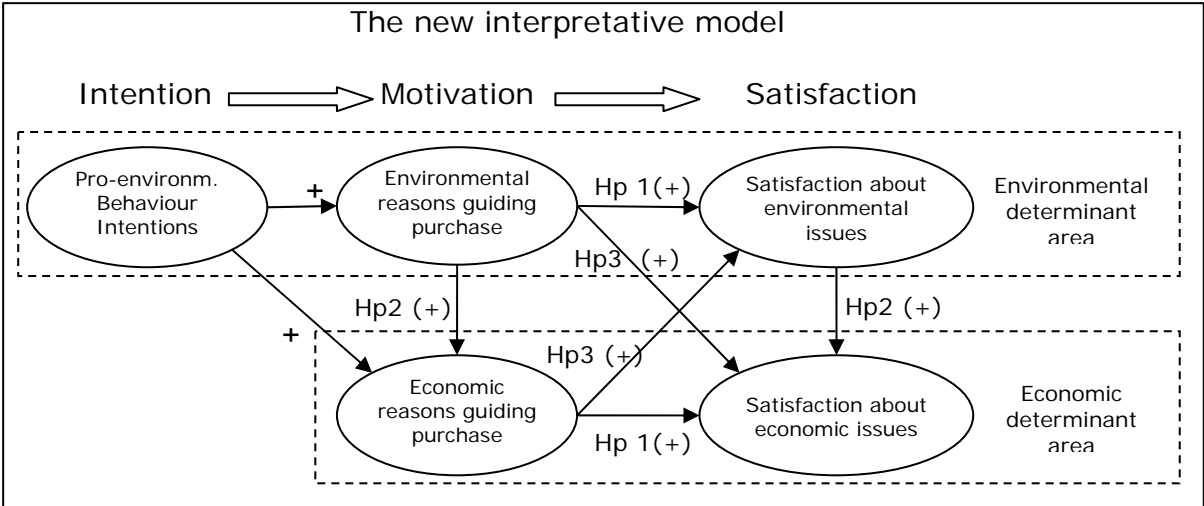

Figure 3 - The proposed new interpretative model

Three are the main pillars of the model: **intentions** which drive **motivations** and the latter that influence perceptions of value, therefore **satisfaction**.

The components explored in this framework are the environmental ones and the economic ones. As regards motivation we identified a construct for environmental reasons guiding purchase, and another for the economic drivers. We distinguished between environmental satisfaction and economic satisfaction. As regards intentions, we based our analysis strictly to the environmental side since the original survey was not designed to broaden the economic intention beyond the choice.

We built dependence relations among the construct in order to evaluate the cause-effect nexus among them.

The first hypothesis (HP 1) at the base of this study is that, there exists a causal positive relation between motives and satisfaction both as regards pro-environmental drivers and economic ones in respect to the relation among expectations and perceived value.

Further more, as a second point, we posit that the pro-environmental motives and economic ones have a co-influence each other being part of the same meta-construct that is pro environmental behaviour intentions (HP 2) .

Finally we sustain, as third point, the idea that there is a positive cross effect between pro-environmental motives and economic satisfaction and conversely a positive effect between economic reasons and pro-environmental satisfaction (HP 3).

In the proceeding of the paper we will try to verify these hypothesis on the base of a study of the motorist behaviour who has bought a NGV or has decided to convert the old gasoline one.

The measurement of bi-fuel car buyer satisfaction: case analysis

Data gathering

Data were collected during a research which consisted of 405 car owners who were selected for participation at five gas (LPG/CNG) service stations while they were filling their cars up. The gas stations were chosen in the metropolitan area of Milan in order to improve coverage of the portion of the Italian population that is more exposed to some of the issues related to this research: severe traffic conditions, air pollution and the relevant debates and limitations. Therefore, five gas stations were chosen: one within the urban area of Milan and four scattered around the suburban belt. Two of the stations sell CNG, one sells both CNG and LPG and two provide LPG and gasoline/diesel. The selection of respondents was spread across the opening days/hours of each station for two weeks from March 2008 to April 2008. The sampling was based upon a random procedure that used time interval as the criterion: the motorists were selected in each gas station based upon their time of arrival at the pump and were then asked for their participation; therefore, all the characteristics of both the drivers and their cars were representative of the clients of each gas station. The non-response rate was negligible, thanks to the total anonymity of interviews and to the short time required.

Regarding the personal profiles of the participants, here are some demographics:

- approximately 78% were male and 22% were female; the incidence of women is much lower than in the general motorists' population

- their mean age was 44, i.e., in line with the average age of car drivers
- their education level was 30% within lower secondary school, 48% upper secondary and 22% university; though the education level of average citizens in Milan is higher than the national population, the sample is highly educated in comparison with the local motorists.

Validation of measurement model

From the database of the 405 respondents we selected the ten questions which are highly logically related to the model of latent constructs presented in figure 3.

Figure 4 shows the association among the five latent constructs and their explicit variables (sentences to be evaluated by respondents). Internal validity of each construct can be measured by the value assumed of the squared multiple correlation (SMC) and the standardised regression weight (SRW) per each evaluated variable and more generally by the value of Cronbach's Alpha (α) for each latent construct.

Latent Construct	Sentence to be evalutated	SRW	SMC	α
Pro-environmental Behaviour Intention				**0,71**
Q1	I feel responsible for environment protection	0,92	0,84	
Q2	I think I should do more to prevent environment from pollution	0,60	0,36	
Environmental reasons guiding purchase				**0,86**
Q3	Bi-fuel car buying motivation has been driven also by a "green" feeling	0,87	0,75	
Q4	One reason to buy a bi-fuel car is the respect of environmental law as a social value	0,84	0,71	
Economic reasons guiding purchase				**0,75**
Q5	Economics and rationale calculus is the main driver to buy a bi-fuel car	0,69	0,47	
Q6	The decision to buy a bi-fuel car is consequent to the increase in fuel cost	0,87	0,75	
Satisfaction about environmental issues				**0,87**
Q7	I am happy to sustain the environment cause driving a bi-fuel car	0,84	0,71	
Q8	I am proud to have a car with reduced emissions	0,92	0,84	
Satisfaction about economic issues				**0,71**
Q9	The balance of economic "pros and cons" of a bi-fuel car is positive	0,76	0,58	
Q10	I am satisfied with the running cost of a bi-fuel car	0,72	0,52	

SRW = Standardised Regression Weights ; **SMC** = Squared Multiple Correlations; **α** = Cronbach's alpha

Figure 4 – The structure of the constructs and their internal validity

As suggested by general rule of thumb the value of SMC should be higher then 0,50 in order to explain large part of the variance in the data of the observed variables (Fornell and Larcker, 1981). Cronbach's alpha indexes are above the minimum threshold (0,7) as suggested by George and Mallery (2003) and Allen and Yen (2002). Further more a Confirmatory Factor Analysis has been made to confirm the internal consistency of the model. Figure 5 shows the factor loadings per each observed variable to the each latent construct implied in the model.

Factor Score Weights	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Pro-environmetal Behavior Intention	**0,12**	**0,70**	0,06	0,05	0,00	-0,01	0,01	0,01	0,01	0,00
Environmetal reasons guiding purchase	0,02	0,11	**0,36**	**0,30**	-0,01	-0,04	0,05	0,09	0,03	0,03
Economic reasons guiding purchase	0,00	-0,01	-0,02	-0,01	**0,18**	**0,47**	0,00	0,00	0,01	0,01
Satisfaction about environmental issues	0,00	0,02	0,06	0,05	0,00	0,00	**0,28**	**0,53**	0,05	0,04
Satisfaction about economic issues	0,00	0,01	0,04	0,03	0,01	0,02	0,05	0,09	**0,30**	**0,25**

Figure 5 – Factor score weights per each question and latent construct.

As we can see in the cells placed on the diagonal of the grid the values are always higher than the ones existing in rows and in columns; therefore we can state that each observed variable (question) finds in the identified construct an appropriate and unique representation.

Fitting the structural model

To find the relationship among the constructs we used SEM (Structured Equation Modeling) supported by AMOS 16.0 software package. SEM is based on a measurement model that shows the relationships between each latent variable and its observed one and then help to detect the best cause-effect nexus among the constructs following the rule of maximum variance extracted but in the meantime the higher parsimony in the links.

The measurement model (five latent variables built on the ten explicit questions) shows the following fitting indexes:

- Chi-square = 98,5 with 28 degree of freedom
- GFI (Goodness of Fit Index) = 0,954
- CFI (Comparative Fit Index) = 0,960
- RMSEA (Root Mean Square Error of Approximation) = 0,079

The GFI measures how much of the actual input data is predicted by the estimated model. Usually, values above 0.80 indicate reasonable model fit (Browne and Cudeck, 1992).

The CFI (comparative fit index) assesses which of two or more competing models provides a better fit to the data. Values above 0.95 indicate a good fit (Bentler, 1992).

The index RMSEA which takes in consideration the error not explained in the data population, is just less than the minimum value (0,080) stated by (Bagozzi and Yi, 1988).

All these considerations helps to confirm our confidence on the discriminant validity of the structured model in reference with the data gathered.

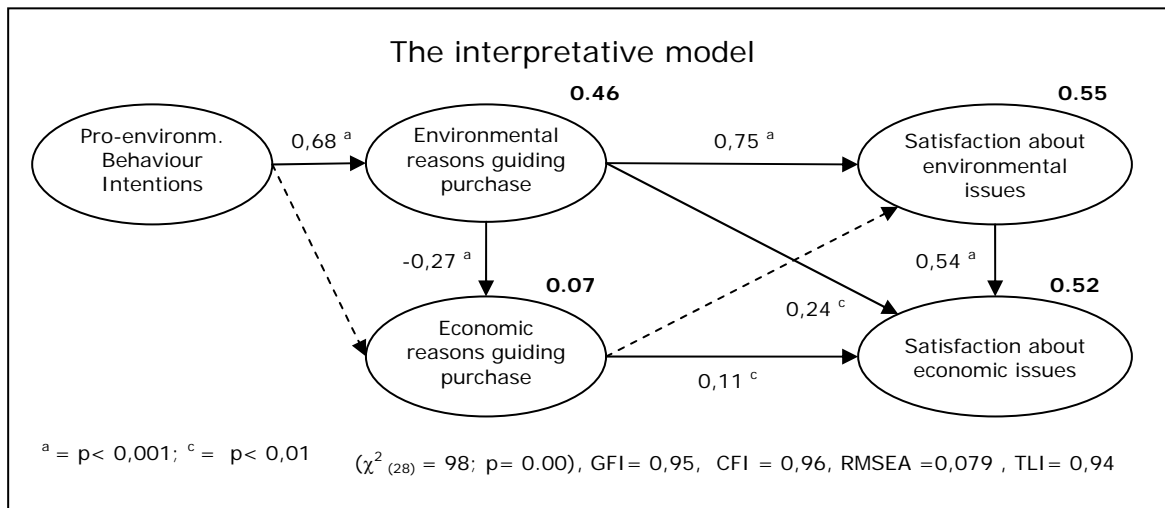Figure 6 shows the structured model with all the indexes and coefficients.

Figure 6 – the model applied to the gathered data.

Main considerations

Pro-environmental Behaviour Intentions feeds strongly eco-sustainable buying reasons (r= 0,68 with p< 0,001) also in accordance with the emergent outcome stated in the previous research (Nadin, Savorgnani and Besana 2009). Naturally this construct has no relevant effects on the economic dimension of the choice (dotted line means non significant regression link) since the driver of it resides in other factors here not detected.

Although the high regression index, the extracted variance of the "environmental reasons" is not so high as we expected in our model. This means that other elements not yet included in the model are drivers as well. One suggestion can be found in the side of the measure of prevention for pollution stated by law. One of the two components of the environmental reasons is the compliance of the anti-pollution law (driving low emission cars) as a social value (see figure 4 – sentence Q4 labelled) when antecedent construct (PBI) does not take in consideration this issue.

As it was easy to predict "environmental motives" have a great regression on the satisfaction for environmental issues. This means that the decision to buy a NGV or convert the gasoline one is intended to be the natural subsequent step after the awareness of air pollution and the intentions to act in a sustainable manner for the environment. Variance extracted in this construct (R=0,55) is enough to confirm the above mentioned considerations.

The output shows that the link between the economic reasons (Q5 – rationale calculus and Q6 – increase of fuel cost) and the satisfaction about the economic side of a NGV is weak (r=0,11 with p<0,001) is weak and therefore the motives that were induced before the purchase are

not entirely confirmed by satisfaction. On the other hand we can say that being the relation among the observed variables in the two constructs almost irrelevant, the buyer outlines a negative judgement about the balance of pros and cons of the NGV (Q9) or about the running cost the car (Q10).

This is a partial confirmation of the first hypothesis postulated (HP 1), since the supposed regression between economic motives and satisfaction is not confirmed. This is a clear case of misunderstanding expectation that do not find satisfaction in the post sales. Among the notes of the respondents we found that they had not evaluated enough the cost of double maintenance related to the engine of the car and any problem of the injection of gas in the engine (not covered by the guaranty of the car in the non first equipped cars).

Pro-environmental motives has a negative regression on the economic reason construct ($r=-0,27$ with $p<0,001$) and, on the contrary, environmental satisfaction has a significant regression on the economic satisfaction construct (Q9- pros and cons of a bi-fuel car and Q10-evaluation of car running cost); $r=0,54$ with $p< 0,001$. This means that the perception of economic effect is blended by ecological feeling. That's to say that in presence of a reduced cost benefit of the NGV the consequent effect would be partially compensated by "conscious" motives that reduce the impact. This offsetting effect would be emphasised by the retro-effect that is exercised by pro-environmental satisfaction on the economic one.

Based on these outputs we can confirm only partially the second assumption previously stated (HP 2) since the relation among the two determinant (economic and pro-environmental) are not always positive as imagined. This reinforces the "sustainability determinant" as a driver of the choice and its powerful effect that can absorb potential lack of economic benefit expectation.

As regards cross relation between economic and environmental constructs, we found also that the construct of satisfaction for economic issues is also influenced by "Environmental motives". Although the high error probability ($p<0,01$), the positive regression indicates that the economic satisfaction can be influenced by reasons less rationale and more related to ecological sentiments. On the other hand, the influence effect of the economic reason construct on the environmental satisfaction one is almost null (see dotted line in figure 6).

This can help to understand better the strength of the pro-environmental determinant on the choice. Although we have noticed a potential over expectation about economic benefit the unsatisfactorily performance is partially mitigated by the cross effect of pro-environmental motives that pushed the purchase.

This is still a partial confirmation of the last postulated hypothesis at the base of the research (HP 3). It is disconfirmed the positive cross link of economic reason with pro-environmental satisfaction.

We have to remark as well that there is a negative regression between environmental motives and economic reasons. This stresses the strength of the environmental issues in the mind of the respondents.

These outcomes induce us to think that, generally speaking, the environmental drivers are stronger than the economic ones since their roots are deeper, being based on personal and unconscious values rather than on conscious factors such as the economic ones.

In this perspective we are pushed to try to modify the interpretative model at the base of the research. Indeed we experimented a trial elimination of the construct of the economic reasons given its reduced influence on the other constructs and the compensative effect operated by the other constructs on the economic satisfaction. The result was a generalized confirmation of the output of the model with the exception for the RMSEA index that suffers an increase of value to 0,099. Therefore we can say that in a parsimony view we can simplify the interpretative model to the three remaining constructs, where pro-environmental determinants are highly regressive both on the two constructs of satisfaction (pro-environmental and economic).

Finally we try to compare the findings of this research with the main considerations emerging from the literature as synthesized in the firsts chapters of this paper.

The pivotal role of social impact of the decision in the mind of the conscious consumer, as stated by Haanpää (2007), is confirmed as well in the findings of our research since the construct of the environmental motives is a cornerstone of the model being a factor influencing both the environmental satisfaction (r= 0,75) and the economic one (r=0,24). In this perspective it is also important to outline the negative regression that this construct performs to the economic reason. We could say that social impact of NGV buyer is so important that contributes to reduce the central position of individualistic benefits that are represented by the economic drivers of the choice.

The positive regression between environmental satisfaction and economic satisfaction is also reinforcing the second assumption of Haanpää related to the future-oriented perspective of the conscious consumer. The dataset of the research shows that the regression is significant from the environmental satisfaction construct to the economic one and not in the opposite direction. This sustains the thesis that the first construct (environmental one) is stronger than the second

and therefore the long term benefit assessment is prevailing the short term one (economic benefit).

As stated in the previous literature chapter review, Szmigin, Carrigan and McEachern (2009) outlined two characteristics of the conscious consumer behaviour: flexibility and inconsistency.

It's not easy to detect these kind of attributes in our study nor in a positive nor in a negative sense, since the particular case analysed in the research does not show a strong compromise between personal and individual benefits and on the opposite social and collective goals, such as environmental pollution protection.

The decision to buy a NGV does not put the consumer in the position to decide a trade off between the cost of personal sacrifice and the respect of deep values such us environmental protection. In this case the two goals reinforce each other as seen previously in the research outputs (see partial confirmation of HP 2).

Therefore it is not easy to investigate the flexible behaviour of the conscious customer to balance the integrity of personal transcendent values and the satisfaction of personal and individualistic perspective. By paradox, in this specific experiment we can have exactly the opposite effect: since the sustainability of environmental deep values is not concurrent or do not clash whit the assurance of the economic personal interests we can face the opposite problem of a strong and over-declared integrity between values and decisions of the customers. And this can be detected by the strong relationships and influences existing between the Environmental determinant area and the economic one of figure 3.

In other words this case can induce some reflexions as regards the emergence and the investigation of the features of conscious consumer behaviour but nothing can suggest as regards the customer attitude to manage flexibility and inconsistency in the trade-off of personal interest and social impact of the decision.

An in-depth analysis

Starting from a multi-classification profile of the interviewed, gathered in the final step of the interview, we decided to split the sample in different subsets in order to test if the previous considerations could change or have different meaning related the essence of the subsets.

We identified two keys of distinction: the type of gasoline fuel alternatives (LPG and CNG or methane) and the source of the decision to have a bi-fuel car (by the automaker, as first equipment installation, and by the car owner, as conversion in the after-market).

The two subsets were identified starting from a product perspective and not from the customer profile, as done in the previous research where we identified three clusters (deepgreen, compliers and eco-what; see Nadin, Savorgnani and Besana (2009).

This decision has been taken on two elements: first of all one related to the aims of the broadening of the analysis and secondly for statistical effectiveness of the in-depth examination. To create subsets from clusters of the respondents it could sound fictitious and subjective, while working on the dual characteristic of the product (LPG fuelling versus CNG and on the other hand, first equipment and aftermarket conversion of existing plates) it sounds more realistic and rich of interests for the practitioners too. Finally we have to ascertain that, at a first glance, the interpretative model run under the three subsets (clusters) has shown signs of statistical inconsistencies.

Figure 7 shows the comparison of the regression weights emerged when the model has been run on the four subsets investigated.

			After market n=177	Sample n=405	First equipment n=228		LPG n=231	Sample n=405	Methane n=174
Pro-environmetal Behavior Intention	--->	Environmetal reasons guiding purchase	0,67	0,68	0,67		0,68	0,68	0,68
Environmetal reasons guiding purchase	--->	Economic reasons guiding purchase	-0,36	-0,27	-0,20		-0,27	-0,27	-0,27
Environmetal reasons guiding purchase	--->	Satisfaction about environmental issues	0,70	0,75	0,77	1	0,70	0,75	0,81
Economic reasons guiding purchase	--->	Satisfaction about environmental issues	-0,03	0,04	0,08		0,04	0,04	0,03
Economic reasons guiding purchase	--->	Satisfaction about economic issues	0,02	0,11	0,13		0,06	0,11	0,10
Environmetal reasons guiding purchase	--->	Satisfaction about economic issues	0,39	0,24	0,11	2	0,30	0,24	0,13
Satisfaction about environmental issues	--->	Satisfaction about economic issues	0,45	0,54	0,63	3	0,45	0,54	0,66

Figure 7 –comparison of model outcomes for the four subsets and the total sample

The main differences emerging from the four subsets compared to the total sample are related to the following relationships:

Point 1 - construct of "environmental reasons" versus "economic satisfaction" one,

Point 2 - construct of "environmental reasons" versus "economic satisfaction"

Point 3 - construct of "environmental satisfaction" versus "economic satisfaction"

As regards the first one we can say that for both the owners of converted cars and LPG supplied ones (two of the four subsets) there is a lesser impact of the environmental motives

on the environmental satisfaction (r=0,70 against an average of 0,75) although the link between PBI and motivation construct is always the same for all the subsets (r=0,68). In other terms we can say that, notwithstanding all the respondents (belonging to whatever subset) have the same driver towards environmental issue, they have different satisfaction reactions. For people who buy first equipment NGV or Methane supplied ones, satisfaction is stronger (until 6 points of regression for Methane subset) and this means an higher confidence in the decision to have a NGV as a way to contribute personally to pollution reduction.

As for the Aftermarket subset and the LPG one, the link between environmental motives and economic satisfaction (point 2) is rather higher (there are 15 points of regression for the Aftermarket subgroup compared with the average total sample). This means that for these two subsets, environmental motives are as well important drivers to confirm economic satisfaction. In other words they have a consciousness for the environment but when they decide about their cars, the eco-sustainable push has lesser intense strength than the one operated in the other two subsets and it turns out more melted with a generalised "rationale" satisfaction.

Last but not least are the consideration about the influences that environmental satisfaction can have over the economic satisfaction (see point 3).

This comparison help to confirm the previous considerations. The two subsets of Methane car owners and the one composed of first equipped buyers show the highest regression in the relation between environmental and economic satisfaction (in average 10 points over the total sample). The desire to offer a contribute to the pollution abatement creates a status of self satisfaction that induce to extend this evaluation as well in the domain of economic satisfaction (higher positive regression). It is interesting to note that in these two subsets (Methane owners and first equipment buyers) the variance extracted in the constructs of satisfaction (environmental and economic) is higher than the average and consequently in the other two subsets (aftermarket and LPG) as shown in figure 8.

Average Variance Extracted	After market n=177	Sample n=405	First equipment n=228	LPG n=231	Sample n=405	Methane n=174
Environmetal reasons guiding purchase	0,45	0,46	0,45	0,46	0,46	0,46
Economic reasons guiding purchase	0,13	0,07	0,04	0,07	0,07	0,07
Satisfaction about environmental issues	0,50	0,55	**0,58**	0,48	0,55	**0,65**
Satisfaction about economic issues	0,53	0,52	0,51	0,47	0,52	**0,57**

Figure 8 - variance extracted for the four dependent constructs of the model.

An higher level of variance extracted is a sign that the model, and in this case the construct, is highly relevant to explain the gathered data and therefore, according to the magnitude of the questions we can certainly state that the two subsets called "methane" and "first equipment" are more oriented to give importance to the environmental facet in car buying decision process.

These conclusions do not clash with the results emerging from the analysis of clusters of NGV buyers done in the first realise of the research (Nadin, Savorgnani and Besana 2009) as reported, in a simplified version, in figure 9.

Type of equipment			Cluster Number of Case			Total
			1	2	3	
D42	Original	Count	126	66	36	228
		%	67,00%	46,80%	47,40%	56,30%
	Aftermarket	Count	62	75	40	177
		%	33,00%	53,20%	52,60%	43,70%
Total		Count	188	141	76	405
		%	100,00%	100,00%	100,00%	100,00%

Type of gas			Cluster Number of Case			Total
			1	2	3	
D43	LPG	Count	93	92	46	231
		%	49,50%	65,20%	60,50%	57,00%
	CNG	Count	95	49	30	174
		%	50,50%	34,80%	39,50%	43,00%
Total		Count	188	141	76	405
		%	100,00%	100,00%	100,00%	100,00%

Figure 9 – an extract of the main characteristics of the clusters (source: extracted from Nadin, Savorgnani and Besana 2009)

Cluster 1 (Deep Green - the most environment oriented) has the greatest percentage of first equipped car (67% against an average of 56%). Cluster 2 (Compliers – people who care about the environment but has decided to buy an NGV primarily to comply with the anti-pollution restriction law) and Cluster 3 (ecowhat? -persons who recognise the importance of environmental issue but do not think that their behaviours could prevent from pollution) show a great percentage of aftermarket cars (53% compared to the average of 44% for the total sample).

As regards the car fuel supply, figure 9 shows that Cluster 1 (Deep Green) has the greatest percentage of car supplied by CNG (methane) (50% against an average of 43%) while Cluster 2 (Compliers) and cluster 3 (ecowhat?) show a great percentage of Lpg car (respectively 65% and 61% compared to the average of 57% for the total sample).

Open points e future researches

Path analysis has been accomplished as an exploratory analysis. Our main purpose was to understand the relationship between motives behind the decision and the consequent level of satisfaction. This has interested both the pro-environmental determinants and the economic ones.

We found that the satisfaction, as the answer to a deep need to feel oneself in line with ecological problems, is stronger than the satisfaction for the cost reduction in transportation.

These results, more challenging than the ones stated in the hypothesises ex-ante defined, require to be confirmed by an extension of the analysis since 400 cases are not representative of the entire phenomena.

For instance, another development of the study could be the extension to the whole Italian motorists population, i.e., to analyse the decision processes of the portion of the population that lives in suburban and rural areas, where the moral pressure on the ecological feelings is probably less intense. The comparison of the two outputs could be enlightening as way to confirm or revise the value of the interpretative model.

Another aspect to take in charge is the longitudinal breath of the research. Extending the research to a new elapse of time could be helpful to confirm or disconfirm of main result here reported.

But finally the most important open point of the study is the understanding of the almost absence of solid models inspiring the analysis of the satisfaction and its antecedents in the domain of pro-environmental decision.

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