Green Marketing of Consumer Electronics: Applying Kano's Theory of Attractive Quality on EcoDesign

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Abstract

To a consumer a green attribute, such as energy efficiency may be far more important for one product than another. For some products it may be seen as essential, for others as nice to have. Business belief says it may even be negative if consumers perceive it as conflicting with the primary functionality of the product.

This paper analyses which green attributes are perceived as positive for which products, and by which consumers. This is done using Kano's theory of attractive quality. An analysis will be presented showing which attributes can be used effectively in green marketing and which shouldn't be.

Key words: *consumer segmentation, green marketing,*

1. Introduction

The greenness of products consists of several aspects such as potentially hazardous material, energy consumption, material use, recyclability and packaging & transportation [1]. The relative importance of these aspects depends both on the specific product and the perspective taken.

Stevels [2] makes a distinction between scientific green, governmental green and consumer green. From a scientific point of view, energy consumption is the most relevant factor for most consumer electronic products [3,4,5]. From a governmental point of view waste minimization often is deemed highly important. As new landfill sites are difficult to open.

Especially consumer green is subject to change over time, as it is influenced heavily by incidents. The recent product recall by Mattel, caused by lead in the paint of toys will probably result in an increased public attention for potentially hazardous substances.

Consumer green is largely based on perceived greenness. As such it is possible to distinguish different groups of consumers within the total population.

Several authors have categorized consumers according to their 'greenness'. Roper AWS frequently publishes a categorization into five groups; 'true blue greens', 'greenback greens', 'sprouts', 'grousers' and 'basic browns'. Stevels [6] presented seven archetypes based on Philips research in Northern Europe executed in the mid-1990s; 'Environmentally Engaged', 'Environmental optimists', 'disoriented consumers', environment too complicated', environmental pessimists' 'growth optimists' and 'enjoy life'. Both ranging from most environmentally conscious to least environmentally conscious (see Table 1).

Based on this categorization and the characteristics of each group Stevels concluded that a small majority of the population is positive or at least neutral towards environmental issues. Fear is widespread, and information needs are high. Furthermore he notes that *"a vast majority of consumers will buy green products from multinationals but only in minority is prepared to pay more"*. Stevels goes on to advocate that environmental benefits should be linked to other benefits, such as economical savings, convenience, safety, or less fear.

Stevels defines four levels of functionality [7]:

- Physical (delivering picture, sound)
- Economical (purchase price, cost of ownership)
- Immaterial (convenience, safety)
- Emotional (fun, feel good)

Based on the seven archetypes, 'greenness' in a product seems to be a nice addition in products, but it should not conflict with primary functionality, which can be any (combination of) the functionalities above. If the 'greenness' compromises the primary functionality, *or if consumers perceive it as such*, a large part of the potential market is lost.

Table 1: Two segmentations of consumers based on the “greenness”.

Roper ASW (2002 data)*		Philips [6]	
North America		North Europe	
True-blue greens	9%	Environmentally Engaged (E.E.)	15%
Greenback greens	6%	Environmental Optimists (E.O.)	15%
Sprouts	31%	Disoriented Consumers (D.C.)	13%
Grousers	19%	Environment too Complicated (E.C.)	15%
Basic Browns	33%	Environmental Pessimists (E.P.)	15%
		Growth Optimists (G.O.)	10%
* Green Gauge Report 2002, retrieved from www.windustry.org		Enjoy Life (E.L.)	17%

This potential conflict in the eyes of the consumer between a green attribute and a primary function of the product leads to a sometimes expressed business belief that in some cases it is better to keep quiet about a products green attributes. This would mean that energy efficiency should be communicated for a refrigerator, as it presents a win-win situation with the economical functionality—it saves money. On the other hand for televisions, energy efficiency might be perceived by consumers as compromising the picture quality, hence compromising a primary function (fun). Here energy efficiency is still a good feature for a product to have, but one better not mention it in the marketing. This business belief seems to be most concerned with the immaterial and emotional qualities.

The aim of this paper is to test these business beliefs in order to make green marketing more effective. Specifically the following aspects are researched:

- Which eco-attributes are positive attributes for which products? The eco-attributes included were energy efficiency, potentially hazardous substances, recyclability, material use and packaging.
- Whether the categorization into Roper or Stevels groups is a good prediction of peoples’ evaluation of eco-attributes.

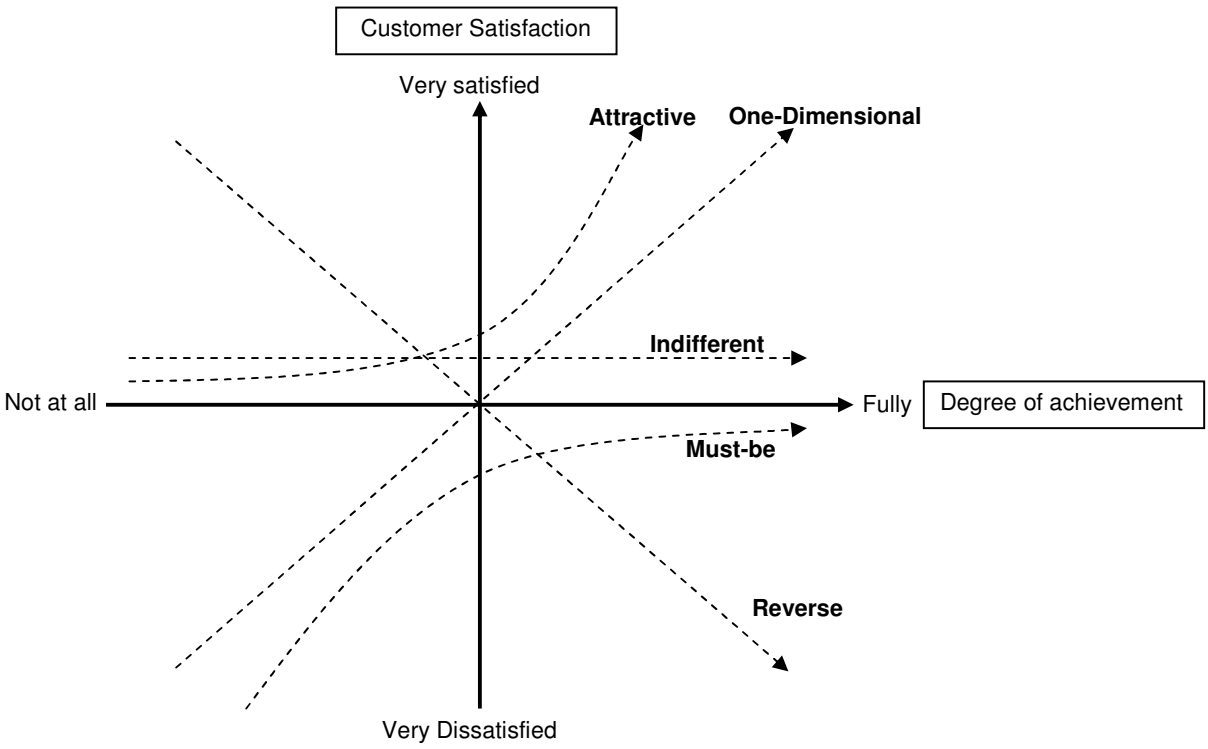

Figure1: The different types quality that exist within the Kano model [after 9].

2. Methodology

An existing theory that seems appropriate here is Kano's theory of attractive quality [8]. Kano distinguishes several types of quality. Both the presence and the absence of certain product attributes can result in a positive or a negative response from consumer, or it might not affect their opinion at all. Different combinations of feelings about the presence or absence lead to the different types of quality.

If consumers are negative about the absence of a product attribute, while not getting excited about its presence, the product attribute is a must-be quality—you need it to not dissatisfy your customer.

If consumers are neutral towards the absence of a product attribute, but very positive towards its presence, the product attribute is an attractive quality. Attractive qualities are interesting for marketing purposes, while must-be qualities are not. One cannot stand out of the clutter, by characteristics that people assume all products to have.

If consumers do not care both for the presence and absence of a product attribute it is called an indifferent quality. Negative feelings towards the absence and positive feelings towards the presence result in a one-dimensional quality. Finally, positive feelings towards the absence and negative feelings towards the presence result in a reverse quality. (For an overview see Figure 1). This reverse quality is what can be expected regarding for instance the noise a product makes. A very quiet product will result in positive feelings, while a noisy one will generally result in negative feelings.

To determine the type of quality Kano developed a questionnaire method, where two linked questions are asked for each attribute, one asking about the participants feeling if an attribute is fully present, one when an attribute is not at all present [9]. The questions are multiple choice, allowing participants to chose from:

1. I like it that way,
2. It must be that way,
3. I'm neutral,
4. I can live with that,
5. I dislike it that way.

Answers can then be converted to a type of quality using the evaluation key in Table 2.

Based on this method questions where generated regarding several green attributes of respectively a TV set, a fridge, a washing machine and a mobile phone. These products were chosen to represent different mixes of the four types of functionality as mentioned by Stevels [7] (Physical, Economical, Immaterial and Emotional). The green attributes were energy efficiency, environmentally sound packaging, recyclability, amount of material used and hazardous substances. Here the negative form of the questions was "without a statement" about energy efficiency and recyclability, "not explicitly" for packaging and amount of material used, i.e. *"How do you feel if a washing machine has a packaging that is not explicitly environmentally friendly?"*, and average for potentially hazardous substances.

Table 2 Evaluation key for survey answers, with A=attractive, O=one-dimensional, M=must-be, I=indifferent, R=reverse, Q=questionable [9]

Quality Attribute→ ↓		Dysfunctional				
		1. like	2. must-be	3. neutral	4. live with	5. dislike
Functional	1. like	Q	A	A	A	Q
	2. must-be	R	I	I	I	M
	3. neutral	R	I	I	I	M
	4. live with	R	I	I	I	M
	5. dislike	R	R	R	R	Q

Participants were also asked normal questions, which were added to allow categorizing participants according to their Roper / Stevels group. These questions related to the participants belief in their own ability to help the environment, their own efforts to help the environment, the confidence in governmental and scientific solutions to the environmental problem, and their willingness to pay extra for environmental attributes in products.

Table 3: The distribution of the respondents over the products regarding energy efficiency.

Energy efficiency	Attractive	One-dimensional	Must-be	Indifferent	Reverse	Questionable
Television set	28	13	29	34	1	7
Refrigerator	19	37	34	17	0	5
Washing machine	11	43	33	16	2	7
Mobile phone	37	18	16	34	2	5

The resulting questionnaire was mailed to a group of Dutchmen. These were partially random chosen from a database and partially through student email addresses.

3. Results

There were 128 responses, of which 112 were usable (the others answered less than 70% of the questions).

For analyzing the results two hypothesis should be tested:

1. the percentage of the participant that see environmental attributes as favorable will be higher with products that mainly have a physical and economical function. Which means products with an emotional function will have a lower score.
2. The positive feelings regarding environmental attributes are higher for people falling in the greener categories of the Roper and the Stevels categorizations.

Table 3 through 7 each show for one particular attribute how the products were scored by the participants.

Table 4: The distribution of the respondents over the products regarding packaging.

Packaging	Attractive	One-dimensional	Must-be	Indifferent	Reverse	Questionable
Television set	31	18	15	41	0	7
Refrigerator	26	25	12	43	2	4
Washing machine	34	15	17	39	1	6
Mobile phone	38	15	8	45	0	6

Table 5: The distribution of the respondents over the products regarding recyclability.

Recyclability	Attractive	One-dimensional	Must-be	Indifferent	Reverse	Questionable
Television set	28	21	10	47	2	4
Refrigerator	33	25	14	34	1	5
Washing machine	33	18	17	40	0	4
Mobile phone	31	18	8	48	1	6

Based on their responses consumers were categorized into the Roper categories both for the Kano questions and the open questions. Table 8 shows the correlation between these two classifications. In bold are the numbers that can be considered closely correlated, with 80 out of 112 participants (71%) falling at least into adjacent categories based on either Kano or open questions. If only the participants that are in the same category both times are counted than that is only 33 out 112 (29%).

4. Discussion and Conclusions

The responses seem to concur quite reasonably with the current day business beliefs. Regarding energy efficiency, it is seen as one-dimensional or must-be by a majority if it is linked to products with a predominant physical and economical function, e.g. refrigerator or washing machine.

For products with a predominant emotional function (fun), such as mobile phones and television sets, energy efficiency becomes an indifferent or attractive quality.

Table 6: The distribution of the respondents over the products regarding material use.

Material use	Attractive	One-dimensional	Must-be	Indifferent	Reverse	Questionable
Television set	25	18	15	47	4	3
Refrigerator	25	14	13	50	3	7
Washing machine	33	16	10	43	5	5
Mobile phone	34	12	13	45	3	5

Table 7: The distribution of the respondents over the products regarding potential toxicity.

Potential toxicity	Attractive	One-dimensional	Must-be	Indifferent	Reverse	Questionable
Television set	39	23	20	24	0	6
Refrigerator	34	30	16	23	1	8
Washing machine	36	21	19	29	0	7
Mobile phone	30	25	23	27	0	7

Table 8: the interrelationship of Roper categories based on open questions and the Kano answers.

Roper based on open questions	Roper based on Kano						Total
	"Outlier"	TBG	GG	SPR	GRO	BB	
True blue green	1	**4**	**5**	1	1	0	12
Greenback green	2	**28**	**24**	**7**	12	3	76
Sprout	0	2	**2**	**0**	**1**	0	5
Grouser	0	2	6	**3**	**5**	**1**	17
Basic Brown	0	1	0	1	**0**	**0**	2
Total	3	37	37	12	019	4	112

The responses regarding packaging show that most people do not care much, with indifferent being the most frequent quality type, while must-be quality scores rather low. The answers with recyclability and material use both reflect that of packaging. People do not seem to be heavily concerned with products that are not explicitly efficient in their material use and explicitly good recyclable. Potential toxicity, finally, gives a rather mixed picture, where there is no product or quality type really standing out.

The categorization of Roper and Stevels seems to give only a limited indication of the feeling participants show regarding specific eco-attributes of products.

Due to the limited number of participants it is more correct to see the following points as hypotheses for future research and not as conclusions:

- Reconfirming a conclusion already drawn by Stevels [6], a large part of the population is neutral to positive concerning the environment,
- For products with a mainly physical and economical functionality (e.g. washing machine or refrigerator) basically all consumers see energy efficiency as an attractive quality,

Finally, also in regard to future research, it is stipulated that, although green aspects may be damaging in the marketing of specific products, a green image on a brand level may be a safe alternative.

Regarding the used methodology it can be said that Dutch people dislike the method of questioning essential to Kano's model. Several participants complained that they saw the way of questioning as extremely boring. Nevertheless the model itself is seen by the authors as a good way of thinking about environmental attributes in products. It helps make sensible decisions regarding the use of attributes in (green) marketing of products to specific market segments.

References

[1] C. Boks and A. Stevels, "Theory and Practice of Environmental Benchmarking in a Major Consumer Electronics Company", *Benchmarking; an international Journal*, Vol. 10, 2003, No. 2, pp. 120—135.

[2] Stevels, A.L.N., (2001) "Application of EcoDesign Ten Years of Dynamic Development" *Proceedings of Ecodesign 2001*, Tokyo, Japan, December 12-15, 2001.

[3] Brezet, H.; C. Van Hemel. *Ecodesign: A Promising Approach to Sustainable Production and Consumption*. UNEP, 1997

[4] Stevels, A.; Griese, H. "Electronics goes green: Current and future issues". *Proceedings of Electronics goes green: driving forces for future electronics*. Berlin, 2004, pp. 45-54

[5] Abele, E., R. Anderl, H. Birkhofer. *Environmentally-friendly Product Development — Methods and Tools*. Springer-Verlag, London, 2005

[6] Stevels, A., "Green Marketing of Consumer Electronics", *Proceedings Electronics Goes Green conference*. Berlin Sept. 2000, pp. 539—542.

[7] Stevels, A., "Towards an operationalization of the proposed European Directive on EcoDesign (Design for Environment) of electronic end use products (EuP)". *Proceedings of EcoDesign2003: Third International Symposium on Environmentally Conscious Design and Inverse Manufacturing*, Tokyo, Japan, December 8-11, 2003.

[8] Kano, N., N. Seraku, F. Takahashi, S. Tsuji, "Attractive Quaility and Must-be Quality", *The Journal of the Japanese Society for Quality Control*, 1984.

[9] Löfgren M. and L. Witell, "Kano's Theory of Attractive Quality and Packaging", *Quality management Journal*, Vol. 12, No. 3, 2005.