EXPERIMENT FOR EVALUATION OF THE EFFICIENCY OF SPONTANENOUS SELECTION TEST

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Evaluarea designului nu trebuie să fie un proces ulterior proiectării, ci se recomandă includerea acesteia în procesul de proiectare cu implicarea segmentului de piață vizat. Printre metodele care se pot utiliza în cadrul acestui demers este şi testul de alegere spontană a unui produs. Această lucrare prezintă rezultatele unui experiment desfăşurat de autor cu scopul de a verifica eficiența testului de alegere spontană a unui produs.

The assessment of industrial design should not be a process subsequent to conception, but is recommended to be included in the conception process with the involvement of targeted market segment. Amongst the methods that can be used in this approach there is the spontaneous selection test of a product. This paper presents the results of an experiment carried out by the author in order to verify the efficiency of the spontaneous selection test.

Key words: industrial design, assessment, spontaneous selection

1. Introduction

The industrial design was, is and always will be at the very basis of promotion, sales and product classification. A goal in conceiving the industrial design of a product is to increase its attractiveness to the buyer. In order to ensure that the industrial design is effective, it should be assessed using different methods.

Usually, the industrial design of products is assessed by the general public and by critics when the product is launched on the market (let us say moment 2). But this moment is too late when thinking about improving the product's industrial design. It would be better to assess the industrial design when the product is still in the design phase (moment 1). The assessors of the conceived model are the design team and a sample of potential buyers (Fig. 1). The focus will be on the positive characteristics in order to maintain them and on the negative characteristics with the purpose of their elimination or at least their attenuation.

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Involving a sample of potential buyers in the assessment process is a valuable idea that provides objectivity and ensures that the market segment has its contribution in the conception of industrial design.

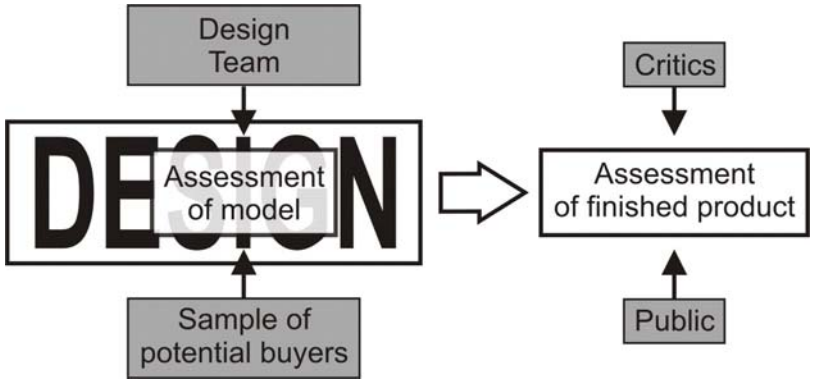

Fig. 1. The two moments of the assessment of industrial design.

It is difficult and with a low efficiency to ask the potential buyers to act like professional critics and assess objectively the product's industrial design. Much easier and more efficiently is to record and analyse the potential buyers' behaviour in regard to industrial design. The methods developed on this approach are called methods based on consumer behaviour.

Anne Brussenberg and Deana McDonagh applied a method which they called the ***visual assessment of the product***. This method simulates the purchase by the Internet or by regular mail. The authors used only the product's image with no texture details. No three-dimensional model was employed. Thus, people can use in their assessment only the product's semantics. In their experiments, the researchers used two types of questionnaires: a) presenting on one questionnaire a single product offering as much possible visual details and b) presenting on one questionnaire a range of products. The results can be used as a basis for further discussion. [1]

The researcher G.H. Losschilder proposed the ***interactive concept test***. Consumers can create their ideal concept, using a computer program that provides a limited set of variations in the shape, material and colour. [2]

Rodica Pamfilie and Roxana Procopie, scholars at the Bucharest University of Economic Studies, present a series of tests based on consumer behaviour in their textbook [3]:

- Test for determining the index of spontaneous attention (it is measured, using a tachistoscope, the time necessary for the perception of product's visual language);

- Test for visibility and readability (it is measured, using a tachistoscope or a visiometer, the reaction in relation with each element of visual language);
- Test for establishing the perceived dimensions (the subject of experiment increases or decreases, using a psychomagnetometer, a spotlight of the same shape as the product until it reaches the dimensions that the subject considers equal to those of product);
- Test for establishing the distances where each element of product's visual language is identified;
- Test for establishing the viewing angle for which each element of product's visual language is identified;
- Test of association (the favourable or unfavourable reaction to a product presented a very short time is measured);
- Test for spontaneous selection of a product (the time of product observation should be very short).

Whether it is recognised or not, the first impression always counts, and this assertion is also true when it comes about products that are used in everyday life. Before choosing a product solely for its functions, the value for money or its reliability, the visual impact intervene and it determines the contemplator to make a decision regarding which is his / her preferred product. For this reason, the last test (spontaneous selection test) is distinguishing as the leading test. But how efficient is it? Is it truly worth applying it? The author of the present paper decided to design an experiment to evaluate the efficiency of the spontaneous selection test.

At this moment, an important observation should be stated. Since a long observation time of the product allows taking into consideration an increased number of criteria (objective and subjective), the time for product assessment should be short and timed. This ensures that the selection of the preferred product will be spontaneous, just based on immediate perception.

2. Design of experiment

The first aspect taken into consideration was the series of products from which the experiment subjects will select the preferred product. It is important that the series of products contain similar products from the same class and not mixed product types. In other words, if, for example, a vehicle is considered, that vehicle should not be combined with consumer electronics or clothing and footwear.

Naturally, the question "how difficult is to select the product" arises, since product series can be established based on several principles [4]. Basically, there are three possibilities to constitute the product series:

- Similar products manufactured by the same company;
- Similar products manufactured by different companies;
- Different products, but in the same class.

In order to carry out the experiment, three series of four products were set up. All products were vacuum cleaners. The first series (A) of products contains similar vacuum cleaners produced by the same company (Electrolux) – Figs. 2 to 5. The second series (B) contains similar vacuum cleaners, but from different companies (Westwood, Philips, Electrolux and Vortex) - Figures 6 to 9. The third series (C) includes quite different vacuum cleaners from different companies – Figs. 10 to 13.

Each experiment subject was asked to look at the four products in a series (displayed together) for only 10 seconds. After this brief exposure, the subject indicated on a worksheet (provided by the organizer of the experiment) which product he / she would buy if he / she was considering only the industrial design criterion (phase 1).

At the end of the experiment, the subjects specified, for all three series, how difficult the selection has been on a Lickert scale from 1 to 5 (where 1 = very difficult and 5 = very easy) – (phase 2).

Fig. 2. Product 1 (Series A)

Fig. 3. Product 2 (Series A)

Fig. 4. Product 3 (Series A)

Fig. 5. Product 4 (Series A)

Fig. 6. Product 1 (Series B)

Fig. 7. Product 2 (Series B)

Fig. 8. Product 3 (Series B)

Fig. 9. Product 4 (Series B)

Fig. 10. Product 1 (Series C)

Fig. 11. Product 2 (Series C)

Fig. 12. Product 3 (Series C)

Fig. 13. Product 4 (Series C)

3. Experimental results

The experiment was performed using 243 subjects. All subjects were young (22-24 years old). The gender distribution of the sample was: 142 female and 101 male. All experiment sessions were supervised by the author.

The experimental data was recorded on a spreadsheet. Several statistical indicators were calculated using the experimental data. Some of them are presented in Tables 1 and 2.

Table 1

Statistical indicators for phase 1 (selection)

	Series A	*Series B*	*Series C*
Standard deviation for women	0.96	1.02	0.82
Standard deviation for men	1.00	0.69	0.61
Standard deviation (overall)	**0.98**	**0.90**	**0.75**
Number of subjects that selected product number … (%)			
"Product 1"	31.7	17.7	2.5
"Product 2"	33.7	28.4	17.3
"Product 3"	23.9	43.6	51.0
"Product 4"	10.7	10.3	29.2
Difference between the first and the second selected product (%)	2.0	15.2	21.8

Because of its simplicity and quickness, the test works better for major differences in product's industrial design, as it can be concluded after analysing the statistical indicators presented above. The average was not considered, because what can express a value like "2.47"? Which product was selected more times? Was it almost equally product 2 and product 3 or product 1 and product 4?

Thus, it can be noticed the consistent difference in the standard deviation between series A (0.98) and series C (0.75), series C lower value indicating a concentration of values around the average.

The observation above is confirmed especially for male subjects. In the case of female subjects, the standard deviation does not decrease linearly, displaying an increase for series B.

Two observations support the argument that the method works better for major differences in product's industrial design. The first observation is that, as the differences in industrial design increased, so did the percentage of votes given to winning product (from 33.7% in series A to 51% in series C).

The second observation regards the difference between the first and the second product within a series, also expressed as a percentage, (from 2% for series A to no less than 21.9% for series C).

Table 2

Statistical indicators for phase 2 (assessment of difficulty)

	Series A	*Series B*	*Series C*
Average for women	3.54	3.65	3.74
Average for men	3.40	3.53	3.75
Average deviation (overall)	**3.48**	**3.60**	**3.74**
Standard deviation for women	0.93	0.85	1.14
Standard deviation for men	0.84	0.81	0.98
Standard deviation (overall)	**0.89**	**0.83**	**1.08**

From the above analysis of statistical indicators, it can be concluded that, without possessing criteria to enable a complex application, it is difficult to test products with slightly different design. The data in Table 2 shows how perceived difficulty of assessment decreases progressively from left to right, from series A (3.48) to series C (3.78). (It should be remembered that 1 stands for very difficult and 5 – for very easy.) Also, it should be noted that the perceived difficulty varies similar for women and for men. The standard deviation does not show the same tendency like in the case of selection, but nonetheless the values are around the same mean.

After running experiments that involve human reactions, like spontaneous selection for example, the results should be tested against reliability. The results can be biased by two main causes:

- Poor experiment design given by overlapping tasks, unclear tasks, etc.;
- Poor responses from subjects due to several factors, including bad will.

The reliability of the experiment as an assessment instrument was measured using the Cronbach's alpha indicator. The Cronbach's alpha is the

classic indicator used in psychometric assessment and this experiment was about psychic responses. Its formula is [5]:

$$\alpha = \frac{N}{N-1}\left(\frac{\sigma_X^2 - \sum \sigma_{Yi}^2}{\sigma_X^2}\right) \quad (1)$$

where N is the number of items (series of products); σ^2_x - the variance of the observed total test scores, and σ^2_y is the variance of item i.

The value of Cronbach's alpha was for the whole experiment:

$\alpha = 0.3$

It is known from the scientific literature that the value of Cronbach's alpha should be higher than 0.70 in order to consider the tested experiment as a reliable one. Because the obtained value was so low, the Cronbach's alpha value was calculated deployed on the two phases of experiment. The results were:

$\alpha_{selection} = 0.97$

$\alpha_{assessment\ of\ difficulty} = 0.35$

Because the calculated value (0.97) is more than higher of 0.70, it can be concluded that the phase of selection is more than reliable and the statistical results are true. But the assessment of difficulty phase scores a low value for Cronbach's alpha, so this phase is considered doubtful.

4. Conclusions

Analysing the experimental data and statistical indicators, it can be concluded that the spontaneous selection test allows the identification of the product with superior industrial design.

Because of its simplicity, quickness and the lack of criteria to allow a comprehensive assessment, this test has shown that works best for series of products with consistent differences in industrial design rather than for series of products with minor differences in terms of design, when many similarities can lead to the perception of almost identical products.

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