

Pet Bottle Design, Correlation Analysis Of Pet Bottle Characteristics Subjective Judgment

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Abstract:

Ability to predict consumer's reaction to particular design solution of the product is very important. Gathering and analysis of subjective judgments of particular characteristics, based on which the aesthetic of the product is judged, is one of predicting the consumer's reaction in the future. Knowledge gathered this manner can serve as a reference for further studies of determining factors for aesthetic results and design quality. There are two opposed opinions regarding prediction of aesthetic impression. One opinion is that taste of individual cannot be discussed because it is extremely variable and the possibility of meaningful analysis of aesthetic impression is rejected. Other opinion states that there is a consistent preference of certain aesthetic characteristics despite individual and group differences. Main goal of this paper is to examine the correlation between subjective judgments of certain PET bottle characteristics. Analysis showed meaningful correlation between some of the PET bottle characteristics while other characteristics showed less correlation. It can be concluded that not all of the characteristics have the same influence on the aesthetics and design quality of the PET bottle form. Emphasizing the characteristics relative to aesthetics of the product can produce better market results, taking in to account that consumer's buy the product they consider to be more attractive if other parameters of the product are similar.

Key words: design, PET packaging, modularity, aesthetic, subjective judgment

Introduction

Importance of the product design is pronounced in the market where packaged goods are levelled regarding quality. In such markets, form or design of the product can be tipping point that pushes consumer in the direction of one or the other product of similar content and quality. When given the choice between two products, equal in price and function, target consumer buy the one they consider to be more attractive (Kotler et al., 1984). The form or exterior appearance of a product is important as a means of communicating informa-

tion to consumers (Nussbaum, 1993). Product form creates the initial impression and generates inferences regarding other product attributes in the same manner as does price (Berkowitz, 1987). In addition to managerial considerations, product form is also significant in a larger sense because it affects the quality of our lives. The perception and usage of beautifully designed products may provide sensory pleasure and stimulation. In contrast, objects with unattractive forms may evoke distaste. Essentially an applied art, product design has a greater impact on our daily lives than do other art forms, because we see products every day (Lawson, 1983). Product form can also have long lasting effects. Although many goods are quickly discarded, the aes-

thetic characteristics of more products can have an impact on prolonged product life.

The first thing that consumer interacts with when faced with any product is packaging. Packaging is generally regarded as an essential component of product. Kotler (1999) defines packaging as “all the activities of designing and producing the container for a product.” (Kotler et al., 1999). Packaging is considered to be a part of the marketing mix, not only enclosing of a physical object product that will be offered for sale. Often packaging is the most relevant element of a trademark advertising or communication. Packaging is an important part of the branding process as it plays a role in communicating the image and identity of a company (Kumar, 2006). PET packaging offers diverse possibilities for communication. Freedom in design concerning shape of packaging results in wide range of possible solutions. A very important function of packaging is the communication of the product with a consumer. Shape of the packaging is also potent tool of communication, unusual and symbolic shape can achieve strong influence on consumer (Novaković et al., 2010). Design is first perceived visually, so there is strong importance of visual impression (Kuzmanović, 2010).

In examining the product, the first component to be discussed is product form itself. A product’s form represents a number of elements chosen and blended into a whole by the design team to achieve a particular sensory effect (Hollins et al., 1990). Designers make choices regarding characteristics, such as shape, scale, tempo, proportion, materials, colour, ornamentation, texture etc. (Kellans et al., 1993). The task putted before a designer is how to mix these elements in order to achieve satisfactory aesthetic results. Today in the environment of harsh competition there is no much room for wrong decisions regarding packaging design; mistakes can make big damage to company reputation. There is a need to examine visual aesthetic impression on a consumer before production process and even before design process in order to obtain maximum advantage. This paper shows research that has a goal to collect subjective consumer judgments of PET bottle characteristics and to find the correlation amongst them.

Psychological Responses To Product Form

The product form may trigger a variety of psychological responses from consumers both cognitive and affective. Although it is useful to distinguish between these two categories of psychological response cognitive and affective responses interact and may occur simultaneously.

Cognitive response

Cognitive response involves consumers’ beliefs about the product and brand (Bitner 1992). Product form may create or influence beliefs about such characteristics as durability, value, ease of use, and prestige etc. Designers often choose particular form elements to proactively encourage the creation of desirable beliefs (Berkowitz 1987). Consumer beliefs resulting from design elements can be completely unanticipated.

There is some debate whether product-related beliefs derive from holistic visual perceptions of the product’s form or from linear processing of one design element at a time. In support of holistic processing, Gestalt psychologists argue that objects are perceived as a whole rather than separately. In contrast, some suggest that reactions to product form are based on atomistic perceptions (Durgee 1988). Accordingly, consumers attend to individual stimulus elements and the fit among them. One way to resolve these two perspectives is to assume that both Gestalt and atomistic processing occur. The product may first be perceived as a whole. If the form warrants further processing, then individual elements may become salient. Consumers may process design elements, such as scale, material, arrangement and stability individually when judging the design.

The categorization is another potentially important type of cognitive response to product form where consumers try to understand a product by placing it within an existing category. Categorization is based on the perceived similarity between a given product and exemplars of various product categories and sub-categories (Loken et al., 1990). When a product’s form is highly unusual the categorization task becomes difficult for consumer (Cox et al., 1987). Research on categorization suggests that consumers prefer goods that have moderate innovative form in comparison to existing products (Meyers-Levy et al., 1989).

Affective Responses

Perception of a product’s form evokes affective responses from consumers, positive and negative ones. In some cases, product form perceptions can lead to a moderately positive response such as simple liking, or they can evoke stronger aesthetic responses similar to those for works of art (Dumaine, 1991). The products can trigger aesthetic responses in consumers, including an engagement of attention and positive emotions. Aesthetic responses derive from the design and sensory properties of the product rather than its performance or functional attributes. It is not uncommon, however, for aesthetic value and utilitarian value to occur together. The goal of product design is to trigger more positive

than negative responses among consumers, especially those in the target segment. These affective responses may be in response to the overall form or may relate to individual design elements.

Descriptors of subjective judgment and form characteristics

Aesthetic impression that packaging achieves is key factor in marketing of the product. By aesthetic preference we consider judgment of the object that observer interacts with. Judgment how much the observer likes the object and how the object measures to other objects of similar use (Mcwhinnie, 1968). Judgment about aesthetic preference can be reduced on judgment "ugly" or "beautiful" and when judging object in a group "more ugly" or "more beautiful" (Eysenck, 1986).

Recognition of the PET bottle is a very important characteristic which helps in communication with the consumer. Packaging able to represent product just by its shape has a far more reach than packaging that relays on a graphical means of information.

Arrangement of the form has important role to play in communication with consumer and transference of design idea.

Form stability is judgment of the shape, form, proportions and mass distribution can influence the stability of the packaging (Wong, 1993).

Shape of the packaging that is usual and is not imaginative does not attract attention of consumer. Having that in mind, imagination and originality are very important in the judging design quality.

Hedonistic appreciation of the object as pleasant or unpleasant must be judged as a separate element of subjective impression, since pleasant is not only beautiful nor unpleasant is always ugly (Eco, 2004)

Intrusive design has very important role in the process of capturing attention but it can be often judged as aesthetically displeasing.

Ergonomics or design which fits the human body is an element of function and can often be in clash with aesthetics (Kroemer, 1994). Ergonomics judgment, although not subjective judgment, can be considered as such if participants have no training in the field of ergonomics.

Method

Participants

Twenty five undergraduate students of the Department of Graphic engineering and design, University of Novi Sad, Faculty of Technical Sciences (14 male and 11 female), age group 22 to 26 years old, participated in this experiment. All participants were randomly chosen.

Stimuli

Eleven PET bottles shown in figure 2. were chosen to be specimens from a start group of 20 PET bottles. Criteria for final choice was difference in form, usage, proportions, level of stylization and none of them could have distinct marking of the product that was in them, such as labels or embossing. The specimens could be grouped according to their characteristics of interest to this study. Such groups as bottles with and without ornament, bottles with imitation of natural textures, etc. Four of eleven PET bottles are present in local market and others are collected from other countries and we can say that participants did not have a chance to see those bottles earlier and form the opinion based on other elements of marketing other than appearance of the bottle. Bottles are marked with numbers (1-11) and lighted from above on the MEGA NORMLIGHT 98 table in order to assure equal light conditions for all PET bottles. The arrangement of PET bottles is random, only rule is that no bottle with same characteristics is placed next to each other.



Figure 2. PET bottles used as stimuli

Instrument

The selection of descriptors of subjective impressions was made. Descriptors were selected by the criteria that they can be used later in the design process as a

recommendations. Bipolar seven point scales from descriptors of opposing meaning were made with positive meaning. Seven point intensity scale was distributed in following manner: three on the positive side and three on the negative side and zero in the middle as shown in Table 1.

Table 1. Descriptors on the bipolar scale

Ugly	3 2 1 0 1 2 3	Beautiful
Unarranged	3 2 1 0 1 2 3	Arranged
Unstable	3 2 1 0 1 2 3	Stable
Usual	3 2 1 0 1 2 3	Distinguished
Unimaginative	3 2 1 0 1 2 3	Imaginative
Unimpressive	3 2 1 0 1 2 3	Impressive
Unpleasant	3 2 1 0 1 2 3	Pleasant
Unelegant	3 2 1 0 1 2 3	Elegant
Unintrusive	3 2 1 0 1 2 3	Intrusive
Unrecognizable	3 2 1 0 1 2 3	Recognizable
Not ergonomic	3 2 1 0 1 2 3	Ergonomic

Alongside with judging the shown characteristics, participants were asked to write their opinion about what the packaging is intended for.

Procedure

Twenty five participants were distributed in to the groups of five and asked to judge on the characteristics of PET bottles in the questioner according to their impressions. They were explained that zero means neutral and that on each side is intensity scale of certain attribute. The arrangement of the bottles was randomized for each group. The eleven bottle samples were shown together to the participants under uniform light conditions. Distance between stimuli and participants was one meter approximately and participants were able to touch, pick up and handle the samples in order to get a better perception of the object. The time for judgment of each PET bottle was not limited, nor was the time for judging all PET bottles. Participants were not allowed inter group consultations or any communication regarding judgment of the PET bottle characteristics.

Results and discussion

Collected data was organized in the data metrics for the further analysis. The bipolar scales were reduced to seven point unipolar scales with positive side of descriptor (Beautiful, Arranged, Stable, Distinguished, Imaginative, Impressive, Pleasant, Elegant, Intrusive, Recognizable, Ergonomic). The matrices were created so that eleven PET bottles were arranged one under another in the rows of matrices and the descriptors were arranged in columns. Correlation between subjective

judgments of bottle characteristics was found by calculating Pearsons bivariate correlation. Results of correlation for all PET bottles are shown in correlation matrix, Table 2. Having in mind that subjective judgment has lower value of correlation coefficient, criteria for meaningful correlation is set higher than 0.5.

From the analysis we can see meaningful correlation between aesthetic impression and subjective judgments of some bottle characteristics. The strongest correlation is between hedonistic judgment (pleasant) and aesthetic impression (0.761 with significance < 0.01). In individual analysis of each PET bottle the highest correlation was 0.913. Hedonistic descriptor pleasant in it self is positive and in case of PET bottles positive correlation with aesthetic impression was found. When looking at the specimens more carefully it can be noticed that none of the specimens is truly unpleasant in the grotesque way and that is the case in which correlation between aesthetic impression and pleasantness decreases.

Arrangement of the form (arranged) has second strongest correlation with aesthetic impression (0.721 with significance <0.01). Individual analysis showed that highest correlation for PET bottle was 0.892. Arranged forms are considered to be beautiful especially in product design. Humans are used to highly arranged environment which influences them to judge arranged things as more beautiful and meaningful.

Elegance of the PET bottle is proven to be important factor in aesthetic impression, with correlation 0.702 and significance <0.01. The highest individual correlation was 0.851. Elegance of the form is well known tool for achieving aesthetically pleasing forms, it can be argued that the correlation is expected to be higher. Stability and imagination of design could also be taken in to consideration, but value of correlation coefficient for these factors is low. The correlation of stability (stable) is 0.389 with significance <0.05 and correlation of imagination of design 0.382 with significance <0.05. Further studies should be done to examine these factors more closely. Low correlation in this experiment should not be taken as firm conclusion, as the specimens could have wider range of stability to obtain more meaningful data.

Hedonistic judgment (pleasant) has second strongest correlation with Arrangement factor (0.599 with significance <0.01). Arranged forms are considered to be more pleasant as they require less effort to contemplate. Imagination correlates with Arrangement by correlation coefficient value 0.591, with significance <0.01. Individual analysis showed that highest correlation in case of boat factors was 0.678. Arranged forms as already mentioned are easier to contemplate thus it can

Table 2. Correlation between subjective judgments of bottle characteristics

		Bea.	Arr.	Stab.	Dist.	Imag.	Impr.	Pleas.	Eleg.	Intrus.	Recog.	Ergo.
Beautiful	Pearson Correlation	1	.721**	.389*	.216	.386*	.093	.761**	.702**	-.036	.170	.123
	Sig.		.000	.013	.181	.014	.569	.000	.000	.827	.293	.450
	N	275	275	275	275	275	275	275	275	275	275	275
Arranged	Pearson Correlation	.721**	1	.425**	.161	.591**	.200	.599**	.396*	.214	.242	.284
	Sig.	.000		.006	.321	.000	.216	.000	.011	.186	.132	.076
	N	275	275	275	275	275	275	275	275	275	275	275
Stable	Pearson Correlation	.389*	.425**	1	.084	.222	.003	.420**	.104	-.029	-.043	-.189
	Sig.	.013	.006		.605	.169	.983	.007	.522	.859	.792	.243
	N	275	275	275	275	275	275	275	275	275	275	275
Distinguished	Pearson Correlation	.216	.161	.084	1	-.262	-.335*	.022	.233	-.493**	-.290	-.063
	Sig.	.181	.321	.605		.102	.035	.893	.147	.001	.069	.698
	N	275	275	275	275	275	275	275	275	275	275	275
Imaginative	Pearson Correlation	.386*	.591**	.222	-.262	1	.543**	.280	.077	.452**	.363*	.263
	Sig.	.014	.000	.169	.102		.000	.081	.638	.003	.021	.102
	N	275	275	275	275	275	275	275	275	275	275	275
Impressive	Pearson Correlation	.093	.200	.003	-.335*	.543**	1	.150	.002	.316*	.472**	.111
	Sig.	.569	.216	.983	.035	.000		.356	.992	.047	.002	.495
	N	275	275	275	275	275	275	275	275	275	275	275
Pleasant	Pearson Correlation	.761**	.599**	.420**	.022	.280	.150	1	.719**	.057	.178	.036
	Sig.	.000	.000	.007	.893	.081	.356		.000	.729	.272	.826
	N	275	275	275	275	275	275	275	275	275	275	275
Elegant	Pearson Correlation	.702**	.396*	.104	.233	.077	.002	.719**	1	-.171	.136	.104
	Sig.	.000	.011	.522	.147	.638	.992	.000		.292	.402	.523
	N	275	275	275	275	275	275	275	275	275	275	275
Intrusive	Pearson Correlation	-.036	.214	-.029	-.493**	.452**	.316*	.057	-.171	1	.648**	.137
	Sig.	.827	.186	.859	.001	.003	.047	.729	.292		.000	.400
	N	275	275	275	275	275	275	275	275	275	275	275
Recognizable	Pearson Correlation	.170	.242	-.043	-.290	.363*	.472**	.178	.136	.648**	1	.251
	Sig.	.293	.132	.792	.069	.021	.002	.272	.402	.000		.119
	N	275	275	275	275	275	275	275	275	275	275	275
Ergonomic	Pearson Correlation	.123	.284	-.189	-.063	.263	.111	.036	.104	.137	.251	1
	Sig.	.450	.076	.243	.698	.102	.495	.826	.523	.400	.119	
	N	275	275	275	275	275	275	275	275	275	275	275

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

be expected for observer to grasp imagination of the designer. Arrangement of the form makes the communication easier.

Hedonistic appreciation (pleasant) showed meaningful correlation with Elegance (0.719 with significance

<0.01) alongside previously mentioned Aesthetic and Arrangement of the form factors. Individual analysis showed that highest correlation between hedonistic factor and elegance for individual PET bottle was 0.822. Elegance as in the case of aesthetic impression is intervened with hedonistic appreciation and recorded

value could be considered lower than expected. Further research is needed to determine these correlations more precisely.

Recognisability as the results show is correlated with Intrusiveness, value of correlation coefficient is 0.648 with significance <0.01 . Individual analysis showed that highest correlation for individual PET bottle was 0.798. Intrusive design although recognisable could cause negative aesthetic impression and should be used cautiously, although this study did not show any correlation between aesthetic impression and intrusiveness of the design.

Conclusion

The value of good packaging design is recognized in marketing. After all packaging design is applied art and the volume of sales is real indicator of design quality. PET packaging offers diverse possibilities for communication on relation manufacturer-consumer. Tools for communication such as bottle shape must be utilized to the maximum of their potential in order to produce best PET packaging possible. Hedonistic appreciation, form arrangement and elegance has greatest correlation with aesthetic impression so it can be concluded that in design process these elements must be handled with special attention. Relation between intrusiveness of the design and recognisability are closely related but relation between intrusiveness and aesthetic impression should be studied more carefully in order to prevent negative effects. This paper examined some of the subjective judgment criteria's and it does not mean that other elements of the design deserve less attention. Functionality and ergonomics deserves special attention with more objective judgment methods and, than, those results can be compared to subjective judgment obtained in this research.

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