

Nov 17th, 12:00 AM

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Citation

(Daniel) Chen, C., and Ling, Y. (2004) The Relationship Between Package Visual Design of Green Products and Consumer Behavior - An Example of Green Laundry Detergent Package., in Redmond, J., Durling, D. and de Bono, A (eds.), *Futureground - DRS International Conference 2004*, 17-21 November, Melbourne, Australia. <https://dl.designresearchsociety.org/drs-conference-papers/drs2004/researchpapers/35>

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The Relationship between Package Visual Design of Green Products and Consumer Behavior – An Example of Green Laundry Detergent Package.

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Both of the environmental protection and the green consumption are emphasized by the government and the enterprise for sustainable development. Especially, some environmental protection regulations and green procurement may encourage the consumer to buy green products. Nevertheless, the green product is usually focusing on the technology and manufacturing, which has caused less attractiveness to the consumer and the market. Thus there is a need to probe the consumer recognition and buying behavior to the green product.

Based on the literature review about the green consumption, the package visual design is the most effective approach to make the green product more commercialized and meet the consumer's needs. The questionnaire was carried out in this study, which has focused on the consumer preference, recognition and behaviors about washing powder with the Eco-label in Taiwan. These factors have shown the influence to the package visual design, such as the concept of green consumption, demographic variable and purchase evaluation.

The conclusion of this research is described in the following:

- 1** There are two main categories for package visual design. One is aesthetic factor which is significantly influential to the consumer preference and buying the goods, and the other one is the environmental conscious factor.
- 2** There has the significant difference between the group of higher recognition of green consumption, and the group of lower recognition of package visual design in consumer preferences and consumer needs.
- 3** There is also a significant difference for package visual design based on consumer preferences and consumer needs, in terms of age, marriage, level of education, and career background.
- 4** If subjects have lower recognition of preferences for this package visual design, it will reduce the desire of making buying decision.
- 5** Eco-label of green product is a particular term for every consumer in green consumption, but most of the consumer still doesn't know what purpose and the system of Eco-label regulation in Taiwan.
- 6** Although the package visual design is an important factor for consumers who want to buy the green washing powder, consumers still emphasize five other factors, such as cleaning effectiveness, protecting the skin, convenient, price, and the word-of-mouth instead of environmental issue.

This research has provided the influential factors, including both categories of aesthetic and environmental conscious factors, to the green package visual design of washing powder, which may help designers to design the greener package for green washing powder as well as other green products.

The Relationship between Package Visual Design of Green Products and Consumer Behavior

- An Example of Green Laundry Detergent Package

Abstract

This research explains the specific relationship between consumer buying behavior and the package visual design. This research involves a questionnaire survey of consumers through the package visual design of green products with the Eco-label in Taiwan. The laundry detergent product category has been selected for the sample. The related research issues, such as functions of product package, green package design, definitions of green products, and green consumption, are also discussed.

This research has explained the influential factors, including both categories of aesthetic and environmental appeal factors, to the green package visual design of the laundry detergent, which may help designers to design the greener package for green laundry detergent and may apply to other green products. It has also reinforced green package design principles which may need to be revised with the consideration of consumers' demographic backgrounds and buying attitudes, Eco-label and Green regulations, the portfolio of green products, and green package visual design characteristics.

Keyword: green product, green consumption, eco-design, package visual design, consumer behavior

1. Introduction

Since the issue of forming a sustainable society and economy has been discussed continually, sustainable consumption may become one of the main research domains for Eco-design. In other words, consumers' needs and attitudes may play an important role in criticizing green products on the market. Thus, there is a need to probe the consumer recognition, preference, and behavior toward green products.

This research explains the specific relationship between consumer buying behavior and the package visual design. This research involves a questionnaire survey of consumers through the package visual design of green products with the Eco-label in Taiwan. The laundry detergent product category has been selected for the sample. The related research issues, such as functions of product package, green package design, definitions of green products, and green consumption, are also discussed.

Based on the literature review and statistical analysis, the result has indicated some factors about consumers, such as the attitude toward consumption, the demographic variable, and purchase evaluation decision making, which may influence the package visual design to a certain degree.

2. Research Method

2.1 Literature review

Related literature reviewed includes package design, definition of green products, consumer buying behavior, green consumption, etc. In the domain of package design, five basic functions of the product package are manufacturing management, transportation protection, identity for promotion, information communication, and environmental protection. Besides, some visual factors such as color, graphics, text, lines, drawings, and other decoration, may influence the consumer's purchasing evaluation.

On the other hand, the definition and regulation of the green product could be determined by the government. Those products passing the requirements are authorized an Eco-label (Fig. 1), which can be printed on the product or the package. Basically, the product with an Eco-label is considered as achieving the environmental requirements in the stage of material, manufacturing, transportation, usage, and disposal. Environmental protection is also

considered in the package design. Three principles of green package design are reviewed: (1) demonstrating the Eco-label or environmental protection certification from an official society, (2) related to the green corporate image or green products in terms of text, graphics, colors and other visual elements, (3) comprehension and readability of green statement text, which may follow the regulation of green consumption. This research has probed the related issues of consumer behavior and package visual design of the green product, which includes the recognition of green consumption, evaluation of buying decisions and significance of demographic variables.



Figure 1. Eco-label for Taiwan

2.2 Questionnaire design

For surveying consumer recognition of the green laundry detergent, this research has applied a questionnaire survey to consumers. The subject and product sample about the survey are described as follows:

(1) The background of subjects which includes their using experience, buying attitude, purchasing decision, and preference of package design of the laundry detergent was surveyed first. Those subjects are all more than 18 years old and 105 subjects were selected. The questionnaire survey was conducted in a chain laundry shop in Taipei city.

(2) Ten qualified samples of the laundry detergent were selected in the beginning (Fig. 2). For the consideration of product and brand similarity, all samples were evaluated and screened to 7 samples by three experienced package designers whose professional experience is more than two years.

(3) 33 subjects with laundry detergent buying experience were chosen for the pre-test. The reliability of the questionnaire design is analyzed by Cronbach's α Coefficient. The evaluation factors of purchase decision, recognition of green consumption, and evaluation of package visual design are all consistent to a reliable value. Then, the questionnaire was revised for validity through reviewing the content by professionals.



Figure 2. 7 samples of the surveyed laundry detergent

2.3 Methods of Statistical Analysis

The analysis for this research has been carried out with SPSS statistical software, which includes Reliability Analysis, Descriptive Statistics, Factor Analysis, and Person Correlation Coefficient.

3. Results and Discussions

3.1 Analysis of demographic variables

The female subjects are 61.3% and male subjects are 38.7% of 93 valid questionnaires out of 105 questionnaires. 55.2% of subjects do not know the existence of green laundry detergent, and 46.3% of subjects do not know the difference between the general laundry detergent and green laundry detergent. Thus, more promotion and explanation activities of the green product may need to be conducted to consumers.

3.2 Analysis of consumer's buying behavior and green consumption

When consumers buy the laundry detergent, they may consider as many as 25 factors in Table 1. Five factors are rank ordered priority such as cleaning, no hurt to skin, convenience, price, and fame, even though the environmental factors including package visual design related items, packaging material, and characteristics of green product are illustrated.

Another survey is to probe the recognition degree of green consumption through a 7 point semantic differential scale in fourth part of the questionnaire. The Means of recognizing green consumption has shown the significance to subjects. But most of subjects would not recognize the content from Eco-label system in Taiwan.

Table 1. Rank order of the evaluation factors of purchase decisions

| evaluation factor of buying decision | Means | Standard deviation | Rank order |
|--------------------------------------|-------|--------------------|------------|
| Cleaning ability | 6.516 | 0.636 | 1 |
| No hurt to skin | 5.935 | 1.325 | 2 |
| Convenience of use | 5.881 | 1.082 | 3 |
| price | 5.849 | 0.884 | 4 |
| fame | 5.720 | 1.101 | 5 |
| Convenience of purchasing | 5.709 | 1.194 | 6 |
| Product portfolio | 5.666 | 1.154 | 7 |
| Usage of product | 5.655 | 1.289 | 8 |
| Valid date | 5.634 | 1.381 | 9 |
| Content of product | 5.516 | 1.372 | 10 |
| Environmental conscious | 5.365 | 1.300 | 11 |
| Contact information | 5.236 | 1.354 | 12 |
| Brand | 5.129 | 1.345 | 13 |
| Dose of concentration | 5.107 | 1.338 | 14 |
| Fragrance | 5.096 | 1.351 | 15 |
| Recycling of the package | 5.053 | 1.541 | 16 |
| Reuse of the package | 4.978 | 1.459 | 17 |
| Eco-labeling | 4.935 | 1.292 | 18 |
| Transportation of the package | 4.881 | 1.660 | 19 |
| Packaging material | 4.720 | 1.409 | 20 |
| Typography of the package | 4.494 | 1.364 | 21 |
| Color of the package | 4.440 | 1.410 | 22 |
| Graphic design of the package | 4.387 | 1.383 | 23 |
| Shape of the package | 4.344 | 1.425 | 24 |
| Coupon | 3.698 | 1.412 | 25 |

3.3 Consumer's preference and evaluation of the package visual design

For surveying subjects' preference toward the laundry detergent package, 7 package samples and the questionnaire were shown to the subjects. In the fifth part of the questionnaire, 19 questions were asked. The result is illustrated in Table 2. The Means on Q16" The factor by which an Eco-label can raise the reliability of the product" of the 7 samples clusters between 4.22 - 5.11, which is statistically significant. Nevertheless, the Means on Q18" I like the package visual design of the sample" of the 7 samples clusters between 2.43 – 4.67, which indicates a lower preference and may not influence the consumer buying decision significantly.

Table 2. The Means of 7 package samples in the questionnaire

| Questions | Sample 1 | | Sample 2 | | Sample 3 | | Sample 4 | | Sample 5 | | Sample 6 | | Sample 7 | |
|-----------|----------|--------------------|----------|--------------------|----------|--------------------|----------|--------------------|----------|--------------------|----------|--------------------|----------|--------------------|
| | Means | Standard deviation | Means | Standard deviation | Means | Standard deviation | Means | Standard deviation | Means | Standard deviation | Means | Standard deviation | Means | Standard deviation |
| Q1 | 4.27 | 1.53 | 3.57 | 1.21 | 3.57 | 1.62 | 4.39 | 1.17 | 5.04 | 1.27 | 4.62 | 1.28 | 4.01 | 1.41 |
| Q2 | 4.58 | 1.62 | 3.63 | 1.32 | 3.69 | 1.56 | 4.42 | 1.31 | 4.92 | 1.36 | 4.54 | 1.31 | 3.99 | 1.43 |
| Q3 | 4.27 | 1.54 | 3.27 | 1.19 | 2.57 | 1.36 | 4.40 | 1.30 | 4.85 | 1.28 | 4.11 | 1.29 | 3.98 | 1.47 |
| Q4 | 4.62 | 1.46 | 3.75 | 1.24 | 3.33 | 1.59 | 4.20 | 1.26 | 5.05 | 1.34 | 4.96 | 1.16 | 3.71 | 1.40 |
| Q5 | 5.24 | 1.25 | 4.30 | 1.28 | 3.38 | 1.57 | 4.55 | 1.27 | 5.12 | 1.36 | 4.18 | 1.38 | 3.61 | 1.44 |
| Q6 | 4.63 | 1.42 | 3.90 | 1.27 | 3.96 | 1.39 | 4.35 | 1.35 | 4.65 | 1.28 | 4.37 | 1.28 | 4.10 | 1.23 |
| Q7 | 4.42 | 1.40 | 3.32 | 1.22 | 2.40 | 1.25 | 4.65 | 1.27 | 4.69 | 1.26 | 3.87 | 1.27 | 4.04 | 1.48 |
| Q8 | 4.65 | 1.39 | 3.69 | 1.17 | 2.67 | 1.33 | 4.68 | 1.27 | 4.65 | 1.39 | 3.99 | 1.42 | 4.19 | 1.41 |
| Q9 | 4.54 | 1.20 | 3.81 | 1.14 | 2.91 | 1.40 | 4.58 | 1.13 | 4.76 | 1.29 | 3.96 | 1.33 | 4.04 | 1.36 |
| Q10 | 3.81 | 1.43 | 3.11 | 1.17 | 2.46 | 1.38 | 3.97 | 1.20 | 4.41 | 1.44 | 3.97 | 1.44 | 3.82 | 1.50 |
| Q11 | 4.18 | 1.56 | 3.18 | 1.17 | 2.22 | 1.29 | 4.47 | 1.30 | 4.52 | 1.40 | 3.74 | 1.42 | 3.84 | 1.60 |
| Q12 | 4.53 | 1.47 | 3.88 | 1.18 | 2.81 | 1.54 | 4.95 | 1.24 | 4.53 | 1.39 | 3.45 | 1.53 | 4.60 | 1.49 |
| Q13 | 4.74 | 1.45 | 3.99 | 1.30 | 2.87 | 1.54 | 5.01 | 1.21 | 4.82 | 1.54 | 3.32 | 1.44 | 4.58 | 1.36 |
| Q14 | 4.77 | 1.34 | 4.27 | 1.34 | 3.81 | 1.56 | 4.49 | 1.39 | 4.68 | 1.29 | 4.15 | 1.56 | 4.32 | 1.34 |
| Q15 | 4.81 | 1.45 | 4.71 | 1.23 | 3.72 | 1.34 | 4.59 | 1.35 | 3.83 | 1.49 | | | 4.49 | 1.36 |
| Q16 | 5.11 | 1.34 | 4.72 | 1.35 | 4.20 | 1.68 | 4.96 | 1.33 | 4.81 | 1.41 | | | 4.81 | 1.32 |
| Q17 | 4.62 | 1.42 | 4.06 | 1.16 | 3.13 | 1.58 | 4.88 | 1.24 | 4.70 | 1.42 | 3.56 | 1.42 | 4.42 | 1.40 |
| Q18 | 4.34 | 1.59 | 3.10 | 1.26 | 2.43 | 1.53 | 4.67 | 1.28 | 4.49 | 1.47 | 3.49 | 1.46 | 3.83 | 1.56 |
| Q19 | 4.14 | 1.69 | 2.86 | 1.35 | 2.26 | 1.48 | 4.41 | 1.41 | 4.35 | 1.54 | 3.41 | 1.51 | 3.59 | 1.64 |

Based on the preference of package visual design, Table 3 shows the package Sample 4 rank ordered highest, and the lowest is Sample 3.

Table 3. Rank order for the preference of package visual design

| Sample No. | Means | Rank order |
|------------|-------|------------|
| 4 | 4.667 | 1 |
| 5 | 4.495 | 2 |
| 1 | 4.344 | 3 |
| 7 | 3.828 | 4 |
| 6 | 3.495 | 5 |
| 2 | 3.097 | 6 |
| 3 | 2.430 | 7 |

The comparison between Sample 4 and Sample 3 could be explained through three clusters in Table 2:

- (1) Obviousness and Identification: From the Q1 to Q6, Sample 4 with the Means between 4.20 – 4.55 is more obvious and identifiable than Sample 3 with Means between 2.57 – 3.96, in terms of graphic design, colors, text, etc.
- (2) Aesthetics: From Q7 to Q11, questions are mainly focused on aesthetics. Sample 4 with Means 3.97 – 4.68 is more visually attractive than Sample 3 with Means between 2.22 – 2.91, in terms of graphic design, colors, text, creativity, and aesthetic expression.
- (3) Communication: From Q12 to Q17, questions are mainly focused on package visual communication design. Sample 4 with Means between 4.49 – 5.01 would communicate the environmental appeal of the product more clearly than Sample 3 with Means between 2.81 – 4.20, which may be influenced by graphic design, colors, text, and usage of the Eco-label.

Basically, the visual design characteristics on Sample 4 are an attractive photo of “Ocean and Beach”, “blue” color of the sky and “white” color of the beach, readability and comprehension of the text, and obviousness of Eco-label. Moreover, the whole package visual layout is more harmonious than Sample 3.

3.5 Correlation analysis of package visual design and consumer’s preference and buying intention

The package visual design characteristics were selected through Factor Analysis, which has shown two factors of aesthetics and environmental appeal in Table 4. The Cronbach's α Coefficient (0.9785 and 0.8671) has shown the reliability of the category.

Table 4. Factor analysis of package visual design characteristics

| Category | Questions | Factor 1 | Factor 2 | Cronbach's α Coefficient |
|--|--|----------|----------|---------------------------------|
| Aesthetics | Attractiveness of graphic design | 0.974 | 0.173 | 0.9785 |
| | Creativity of the package design | 0.960 | | |
| | Easy to distinguish | 0.958 | -0.114 | |
| | Identify obviously among other packages | 0.939 | -0.203 | |
| | Aesthetic appearance | 0.929 | 0.325 | |
| | Attractive Colors | 0.926 | 0.347 | |
| | Good graphic design | 0.924 | | |
| | Readability of the text | 0.915 | | |
| | Proper layout of graphics and text | 0.913 | 0.396 | |
| | Proper color plan | 0.897 | 0.401 | |
| | Understand clearly about the text of green content and usage | 0.801 | 0.534 | |
| Identification of the brand typography | 0.792 | 0.274 | | |
| Environmental Appeal | Proper location and size of the Eco-label | -0.205 | 0.958 | 0.8671 |
| | Raising reliability with the Eco-label | -0.134 | 0.935 | |
| | Proper color for the environmental appeal of the product | 0.652 | 0.749 | |
| | The package can communicate the environmental appeal of the product | 0.677 | 0.726 | |
| | The graphic design can communicate the environmental appeal of the product | 0.653 | 0.708 | |

Based on the analysis of the Pearson Correlation Coefficient in Table 5, the result has shown that factor of aesthetics (0.876 and 0.908) has shown the significance of correlation with consumer's preference and consumer's buying intention accordingly. That has illustrated the consumer's preference is influenced more by package visual design and the content of the product. For analyzing the correlation coefficient of the factor of environmental appeal (0.440 and 0.337) and consumer's preference and consumer's buying intention, the result has shown a less significant correlation and indicated the factor of environmental appeal may not influence consumer's preference and consumer's buying intention about the product.

Table 5. Analysis of correlation between consumer's preference, consumer's buying intention and two package visual design factors

| | factor of aesthetics | factor of environmental appeal | consumer's preference | consumer's buying intention |
|--------------------------------|----------------------|--------------------------------|-----------------------|-----------------------------|
| factor of aesthetics | | | | |
| factor of environmental appeal | 0.000 | | | |
| consumer's preference | 0.876 | 0.440 | | |
| consumer's buying intention | 0.908 | 0.377 | 0.997 | |

Eventually, this research has illustrated that both factors of aesthetics and environmental appeal need to be considered when designing package for the green laundry detergent. The environmental appeal is not the first five priorities in this research, thus, the factor of aesthetics is more important for promoting green products to the consumer.

4. Conclusions

Through review of survey results leads to the following conclusions:

- (1) There are two main categories for package visual design. One is the aesthetic factor which is significantly influential to the consumer's preference and buying intention, the other one is the environmental appeal factor.
- (2) When consumers buy the laundry detergent, they may consider five factors for priority such as cleaning ability, no hurt to skin, convenience, price, and fame. Less priority goes to (in rank order) the environmental appeal factors including package visual design related items, packaging material, and characteristics of the green product.
- (3) Based on the survey result of consumer's preference and evaluation of the package visual design, the package visual design of Sample 4 is rank ordered highest and Sample 3 is the lowest. Three clusters for evaluation are obviousness and identification, aesthetics, and communication.
- (4) The factor of environmental appeal has shown a less significant correlation and may not influence consumer preferences and consumer buying intention toward the product. On the other hand, the factor of aesthetics has shown a significant correlation, thus this factor still plays an important role in consumer preferences and consumer buying intention toward the product.
- (5) The Eco-label of a green product is a particular element for green

consumption, but most of the subjects still don't know the purpose and the Eco-label system in Taiwan.

This research has explained the influential factors, including both categories of aesthetic and environmental appeal factors, to the green package visual design of the laundry detergent, which may help designers to design the greener package for green laundry detergent and may apply to other green products. It has also reinforced green package design principles which may need to be revised with the consideration of consumers' demographic backgrounds and buying attitudes, Eco-label and Green regulations, the portfolio of green products, and green package visual design characteristics.

Further research

- (1) More categories of consumer products can be chosen for the survey, so that the green package visual design principles may be more practical and applicable.
- (2) Content analysis can be applied for the analysis of correctness of the package context of the green product, which may correspond to the green consumption and green marketing regulation.
- (3) Package designers and researchers may conduct more surveys on consumer behavior, so that some demographic variables may illustrate more environmental appeal to consumption attitudes and the design profession.

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